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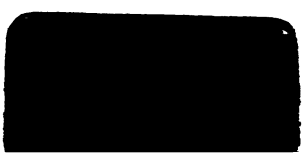

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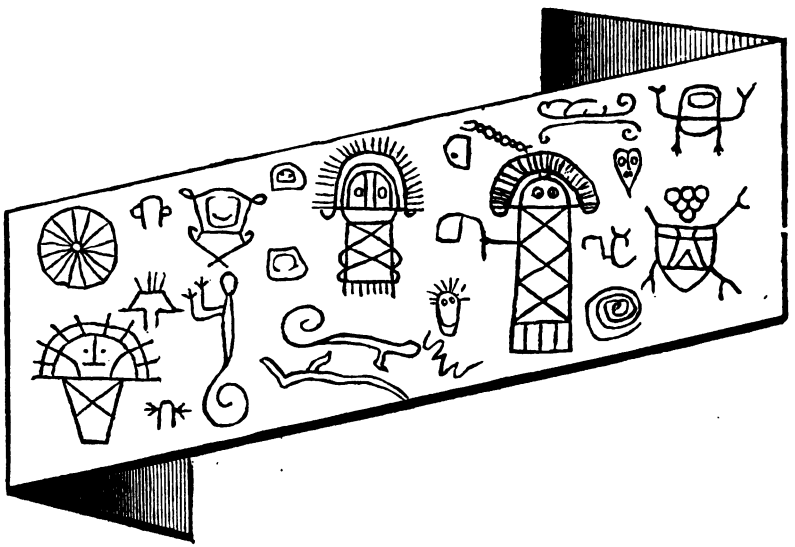

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Twenty Years' Improvements in Demerara Sugar Production.

By Seaforth M. Bellairs, Manager, Chateau Margot.

PART II.

THE record of the last twenty years in the 'Buildings' or Manufacturing Department of Demerara Sugar Estates, is very different from the record of the field. In the latter the alterations have neither been many nor important, but there has been a regular revolution in the former. The reason of this is easy to see. Agriculture is the oldest occupation of the human race, so we cannot hope for much improvement in the comparatively short space of twenty years. But with regard to machinery we are still learning the very alphabet, and the progress of even a few years is absolutely startling.

To keep some sort of order let us pay an imaginary visit to a sugar factory, and as we inspect each department we can consider what has been done in the last twenty years in the way of improvement.

We will begin at the beginning which is the cane-carrier.

Transf. H.C.L.
May 26, 1942

There has been much talk about improving the way in which the contents of the punts are to be placed on the carrier. It has been suggested that the punts could be raised bodily out of the water, either by a hydraulic ram, or any other suitable means, and the contents shot out on to the carrier, by simply turning the punts upside down, but I do not think that there has ever been any attempt to try the experiment, except, perhaps, with small models. The only improvement that I know of, is the elongation of the carriers of the large mills, so that four punts can be discharged at the same time, whereby the throwers are not so crowded and there is not so much 'keep back' when the punts are changed.

With regard to cane throwers, it is a singular thing that the number of men allowed for this work is nearly the same on every estate, though this similarity is quite accidental; nearly every estate employs a man for every ton of sugar made per day. Thus, an estate making 15 tons of sugar a day will have about 15 men throwing canes.

The next thing we come to is the cane engine and mill, and to describe the alterations attempted in this department, during the last twenty years, would take a whole *Timehri* to itself.

To begin with the engine. There used to be much dispute as to the relative fuel economy of condensing and 'high pressure' engines. In old days it was not an uncommon sight to see an estate throw the whole of its 'back-pressure' steam into the air, and in such cases there could be no doubt that a condensing engine was the most economical. But we are much more careful now-a-days; the present price of sugar cannot afford such

extravagance. We all know that steam is fuel, and fuel is money. It is now universally acknowledged that the higher the initial pressure, the greater is the economy, provided always that every atom of steam that passes from an engine is used for heating purposes.

However, the relative merits of different engines is not so much a sugar maker's question as an engineer's. So let us pass to the mill.

There are still very many mills at work in this colony that were working twenty years ago, but they do very different work. Crushing that would have been considered very creditable at that time, would not be tolerated now, and many mills that are tolerated now are a constant grief to the sugar maker, and it is only the want of the capital necessary to put up a new crushing plant that keeps many a Demerara mill from the 'scrap heap' in the yard.

The difference between 65 and 70 per cent, is a thirteenth of the whole; that is, an estate making 1,300 tons of sugar a year with a mill giving 65 per cent, would turn out 1,400 if the mill were made to give 70 per cent, and the extra hundred tons would be produced almost free of cost.

The first great stir and enquiry into the actual and possible work of our mills was when Mr. RUSSELL first brought out 'maceration;' every body began to weigh canes and megass and see what his mill was doing, and try what it could be made to do The first result was an alarming list of breakages—mill pinions, spur wheels and trash turners smashed in every direction; and one of the first great improvements in the mills was the almost universal adoption of steel gearing.

Then the head stocks proved to be the weak point. It was found that with indirect bolts no plate could stand the great strain, so head stocks with through way bolts had to be imported.

The next trouble was the trash turners, enormous bars of iron bent beneath the fearful strain. The whole principle of having trash turners at all was felt to be faulty; carrying huge quantities of megass across wide plates of iron under enormous pressure was obviously, to say the least of it, a great loss of force, especially as the motive power was the friction of the moving top roller.

Mills were brought out with moving trash turners, but I cannot say that they have proved the success that was anticipated. Mr. ALLAN showed a model of a mill with no trash turner at all. I believe that this mill has been erected on Pln. *Albion,* and is doing very good work, but I have not seen it, nor any statistics of what it is doing.

Mr. SKEKEL also claims to have invented the mill of the future, and he explained this mill, which has come into practical existence at Pln. *Herstelling*, to the Royal Agricultural and Commercial Society.*

I need not say very much about 'maceration' and double crushing. Double crushing is a great improvement, but how far it pays to soak or macerate the megass of course depends on the relative values of sugar and fuel.

The original idea was to have one mill in front of the other, but the objection to this arrangement is that, in case of any accident to either, both are rendered useless, while if the mills are alongside each other, each or eithe

* See *Timehri*, 1888, Vol. II, Pt. I, p. 207.—ED.

acts as a spare. The first carriers for conveying the megass from the one mill to the other were clumsy things very much larger than were necessary. Mr. TILLEY was, I believe, the first to see that if the weight of the megass was less than half the weight of the canes, then the carrier of the megass need not be larger than half the size of the cane carrier. Moreover by making the megass carrier travel at double the rate of the cane carrier it need only be a quarter of its size and strength.

The difficulty of giving the second mill a constant, regular feed was met by arranging over it a shovel shaped like those used by bankers for shovelling gold. This is automatically waved to and fro by an ingenious eccentric so as to spread the megass in a layer of uniform depth on the moving lower roller of the second mill. As long as both engines are high pressure, and absolutely none of the exhaust steam is allowed to escape, the fuel required to drive the second mill is scarcely appreciable. So I think that double crushing, with or without maceration, may be set down as one of the greatest improvements effected during the last twenty years. No matter how good your first mill may be, be sure that a second will give such a further amount of juice from the seemingly exhausted megass as will be simply astonishing.

On looking back, one is amused by remembering the dismal prognostications as to the certain deterioration of the megass as fuel. It was taken as axiomatic that the more the canes were crushed, the worse the result would be, as if it were the juice that burnt.

Experience has taught us the exact opposite. The drier the megass, the better it burns. "Can water burn?" was the answer of the late Mr. RUSSELL to those

who raised this argument against double crushing. As to the effect of maceration on the fuel, it, of course, entirely depends on the dryness of the megass when it leaves the second mill.

However, it does not do to talk of fuel while we are still at the mill, that subject should not be considered till we arrive at the boilers. We will suppose that the imaginary estate we are visiting is trying to make the best possible sugar, yellow crystals for the London market. In that case the next thing we shall have to examine will be the sulphur box. Twenty years ago there were no sulphur boxes. The bleaching agent used was not free sulphurous acid, but bisulphite of lime, which did pretty well but cost a lot of money.

The first sulphur boxes were awful machines; they reminded one of the corkscrew in the picture of Hogarth's —such an enormous apparatus, and such very slight results. They were also constantly getting out of order, and estates had to keep a puncheon or two of bisulphite handy in case of need. This antique instrument—and there was a time when we gazed on it with pride—was like a gigantic churn, driven generally from a pulley on the cane engine, but the more 'swagger' estates, I think, gave it an engine all to itself. There used to be a mania for giving things engines all to themselves. Each centrifugal used to have its own separate engine, and so did the pug mill, and many other things. And as all the exhaust steam was thrown away, the consumption of coal was very great, sometimes as much as 24 cwt. of coal to the ton of Sugar produced, but what did that matter with sugar at 30/ the cwt.?

To return to the Sulphur Box. The apparatus in

present use is simplicity itself. It is simply a box made in any convenient shape. The juice enters at one end, and is broken into spray, it falls like rain through the box and gets out at the other end; the fumes of burning sulphur enter at the bottom, and what is not absorbed by the juice exits at the top. The sulphur is burnt in a simple furnace generally made out of an old condensed-water trap, and is either blown into the box by a steam jet or a slight vacuum is created in the exit chimney by a jet, which makes the draught necessary to carry the fumes into the box. The box is generally 'sealed' so that air cannot enter at either end; this can be done by the simple expedient of turning up the ends of the pipes which carry the juice to and from the box, thus the pipe is always full of fluid; and to prevent any chance of acidity, a small drain hole is made in the bottom of the bend, to empty the pipes when the mill stops. This is somewhat difficult to explain in words but a sketch would show the arrangement at a glance. It has been found that the sulphur does not all unite with the oxygen; in fact there are two operations going on simultaneously, the one is combustion, the other distillation. The consequence is that, not only does the juice absorb some of the sulphurous acid, the result of the combustion, but it also condenses the boiling sulphur, precipitating 'sublimed sulphur' which is deposited along with the subsidings of the clarifiers, and if allowed to get into the 'wash,' does immense damage to the quality and flavour of the rum. It has been suggested that the best way to prevent this is to draw all the fumes of the burning sulphur through water, just like a hookah, or coolie 'hubble-bubble' pipe. But now that all the subsidings go to the filter presses, instead

of the distillery, this is not of so much consequence, as the sulphur finds its way to the field, along with the filter press refuse. On the other hand some particles of sulphur, with a most distressing obstinacy, *will* take up one atom too much oxygen, thus converting themselves into *sulphuric* acid, instead of *sulphurous* acid as required; this goes into the box and starts a private factory of glucose, which shows itself very plainly in the large amount of molasses which comes away from the 'masse cuite, in the centrifugals. To prevent this the fumes can be filtered through gas coke placed on perforated trays. Care must however be taken that the hot fumes do not ignite the coke, which would be attended with disadvantages.

The juice on leaving the sulphur box enters the 'juice-heater.' There are some who prefer to sulphur hot, in which case the juice-heater would come before the sulphur box; those in favour of sulphuring cold declare that there is much more 'inversion' in the box when the juice is hot. The most serious argument in favour of sulphuring hot is that the juice heater avoids the corrosive effects of the sulphur gas, which attacks every metal and quickly eats them away.

I once imported a sulphur box made entirely of fire clay, and thought that I had done a very clever thing and had solved the difficulty of corrosion; we started, and as soon as it got hot I heard 'tink', 'tink,' and the whole apparatus splintered to atoms, so we had no opportunity of seeing whether that material would resist the corrosive effect of the gas. No metal can. Lead is the best, but that is so liable to melt that we have to be content with copper, and constantly renew the metal part of the apparatus. The fumes have no effect on wood.

I do not think that there has been any improvement in juice heaters during the last twenty years. They were, and are, too weak when the mill is grinding fast, and they did, and do, boil over when the flow of juice is smaller.

We now come to the clarifiers. There is no improvement in the clarifiers, in fact it is here that the effects of extravagant economy are particularly noticeable. Twenty years ago most of the clarifiers had steam pipes in them. A few had the old fashioned plan of fire under them. I remember one estate where there was a separate chimney to each clarifier, and a thin curl of megass smoke announced to the outside world when each clarifier was filled.

It is well known that there is one exact 'cracking point', and it is distinctly advisable that the juice should be heated *up* to this point. The same perfect clarification is never obtained when the juice is cooled to that temperature. Therefore the juice heater should always discharge the juice at a temperature slightly *below* the 'cracking point.' About 180 deg. Fahr., would be about the thing. Then it should receive the further heat in the clarifiers themselves. But the tubes, trunnions &c., necessary to heat the clarifiers are dear, and they do not last for ever, especially if subjected to the action of the omnivorous sulphur, so they have been discarded on most estates and the sugar maker has to do the best he can with the juice-heater alone. One clarifier, when full stands perhaps nearly boiling and the next possibly only 160 deg. Fahr. This may mean sugar that is not quite first class, or a loss of from 3d to 1/6 per cwt. on the whole crop.

It used to be believed that closed evaporators could not make as pretty sugar as was made by the old 'copper-

wall.' I believe that Mr. DUNCAN at Pln. *Hampton Court* was the first sugar maker who succeeded in turning out really first class sugar with a triple effect. And his success was entirely due to perfect clarification. This clarification was effected by heavy liming, in fact any excess of lime mattered very little unless extreme, for all the excess of lime was precipitated by the use of phosphoric acid, in the shape of the insoluble salt, phosphate of lime. The use of this acid was impossible unless the evaporation was done at a low temperature, that is *in vacuo*, for if there be any free acid, the great heat of 'those disgusting frying pans,' the teaches of the copper-wall, would naturally cause inversion, and set up a huge molasses factory instead of sugar works. In addition to the better quality of sugar, the users of phosphoric acid claim to recover a much larger percentage on the polariscopic readings, in fact some go so far as to assert that the recovery is equal to that obtained when refining, non-chemical, sugar is being made.

These assertions are very difficult to prove: sugar factories are scarcely adapted for very exact chemical experiments. There were (of course there are none at present) planters who knew how to cook other things besides cane juice.

In the application of lime there are also many improvements during the last twenty years. The lime is no longer weighed; it is now mixed with water to a certain density (generally 10 Bè., but some prefer 17 Bè.), this is a smooth liquid, 'cream of lime.' By this means the sugar maker can give a very exact dose of lime to each clarifier. The phosphoric acid is administered in exactly the same way.

If the estate is making refining sugar for the United

States' market, neither sulphur nor phosphoric acid will be used. This sugar is all refined into white sugar before it reaches the consumer. When making sugar for the English market, it is most important to make a pretty sugar that will please the eye. It is a well-known fact that wherever the housekeeping is done by the 'fair sex,' the producer has to think of the look of the things, while wherever the sterner sex do the catering, it is the palate that has principally to be considered.

When the juice leaves the clarifiers it goes into the evaporators. These were, twenty years ago, the copper-walls, so called in this colony on the '*lucus a non lucendo*,' principle, for there was not an atom of copper about them. The copper-wall had a twofold duty to perform; it evaporated the water and concentrated the juice to syrup or sugar, and also, by skimming, the boiling fluid was cleansed. There are all sorts of objections to the old copper-walls, but I think that, as regards the palate, 'muscovado' sugar with its delicate pine-apple flavour, was, especially when new, the nicest sugar that has ever been made, and far preferable to the finest loaf, which has, either no taste at all, except sweetness, or a distinctly nasty flavour. However we have to make what the buyers want, and if the English public like a large grained bright yellow sugar, that is just what we must give them. If they wished for it pea-green or sky-blue we should have to do the best we could to meet their wishes. Now-a-days the copper-walls are rapidly disappearing, and the present system is to send the juice to the eliminators, which the people in the buildings generally call 'illuminators', where it is subjected to a brisk boil, and those impurities that have not subsided in

the clarifiers, now rise to the surface in the shape of skum and are removed. This as a rule finishes the cleaning process, the subsequent processes are chiefly evaporative. There are some who advocate filtering the juice after leaving the eliminators and before it enters the concentrators, but this is rarely, if ever, done.

Before visiting the evaporators let us see what has become of the subsidings and skimmings. Twenty years ago these would have gone into coolers, and then have been sent to the distillery and turned into rum, and when rum was selling at a very good price this was the best way of disposing of them. The buyer of rum does not want alcohol or any physicky stuff, he wants something nice to drink, and there can be no doubt that skimmings, undoctored with chemicals, does make a delightful spirit, delicately flavoured with the distinctive aroma of the sugar cane, as anyone who has ever visited Jamaica can testify—something very different to the coarse fiery stuff, which we turn out from the refuse of our sugar factories. JOHN GIRDER in 'The Bride of Lammermoor' says, "and if there is anything totally uneatable, let it be given to the puir folk." And we say if there is anything that cannot possibly yield any sugar, send it to the distillery.

We subside our skimmings and then pass the refuse through the filter presses, and sometimes wash the cake by passing water through it so as to exhaust every possible particle of sugar. We re-boil our molasses at least once, and are then surprised that our rum has not a good name. We set up a mixture of dirt from the filter presses from which nearly every atom of sugar has been extracted, trench water, and molasses which has been heavily limed and re-boiled so as to be as poor as it can possibly be. We

are careful that this mixture shall stand exactly at 1060 S.G., then we expect it to attenuate to 1,000 S.G. and to yield 8 per cent of nearly absolute alcohol. As if we were able to *create* spirit.

All this care with the skimmings and molasses is undoubtedly a great improvement from the sugar point of view, and pays, unless sugar be selling very low and rum very high; but still it is absurd to eat our cake, in the shape of sugar, and expect to have it too, in the form of rum.

Well, let us return from this short digression to the distillery, to our evaporators.

The first *closed* evaporators in this colony are much older than twenty years, there is one at *Chateau Margot*, a vacuum pan, dated 1847.

The first *multiple* evaporator is, I believe, the triple effect at *Vryheid's Lust*, but I am not sure that the one at *Enmore* is not a little older. I do not think that either one is twenty years old yet.

Sugar makers believed that the fine bright yellow colour of the far famed Demerara crystals was due to the scorching the juice received from the intense heat of the copper wall. They argued that the dull sugar made in closed evaporators fetched about 1/6 per cwt. below the best prices, and this 1/6 per cwt. gained in the superior quality of the old fashioned sugar more than covered the whole of the fuel account.

It is true that the percentage of recovery on the indicated sugar was less with open evaporation than with the cooler boiling in vacuo, but only a few knew what was indicated, and these comforted themselves by considering that what was lost in sugar was gained in rum.

I dare not enter into the relative merits of the various kind of multiple effects; they are, all of them, improvements introduced during the last twenty years. Every one firmly believes in the apparatus that he is used to. We have all our own peculiar fancy, and our doxy is orthodoxy, and every one else's doxy is heterodoxy.

Anyway, they are all much better than the old copper walls, and so may be classed among the improvements of the last twenty years.

We now come to the vacuum pans. There is no great improvement here. The machine is not now regarded with the same awe as it used to be. Twenty years ago the pan boiler was a sort of 'boss conjurer'. He alone knew all the marvellous secrets that were 'into' the proof stick. The old time planters knew very little of modern methods. I knew a proprietor, but I am glad to say not of British Guiana, who thought that Litmus papers were some essays written by a Mr. LITMUS on the subject of clarification. In the vacuum pans the syrup is boiled into masse-cuite, this is 'struck' into coolers, which were, twenty years ago, always very large. I am sure I do not know why, but they always were very large, and no one ever thought of making them otherwise. A half naked labourer used to stand up to his middle in them and dig out their contents, with great expenditure of strength &c. The &c., used to go, eventually, into the rum, I suppose.

Now, many estates have very small coolers. So small that they are called by the people 'sugar cans' from their resemblance to the tins containing salmon &c. These cans hold about 500 lbs. of masse-cuite each, and they are very easily handled and transported. They are lifted up by a table rising on a hydraulic ram, they are turned up-

side down, and the contents fall into the pug mill. By this means the curing is much cleaner and quicker than it used to be, and the recovery is much higher, for it has been found that sugar goes on crystallising while cooling after it leaves the pan, and the more rapid the cooling the greater the crystallisation. The curing is effected by WESTON'S centrifugals, each one able to dry a ton of sugar in two hours with the greatest ease. The dry sugar falls on to a traveller which lands it into a trough, emptied by ascending scoops fastened on to an endless belt, called a 'Jacob's ladder', which carries it into the sugar store. How different to the process twenty years ago. There were sugar diggers, masse-cuite carriers and slow centrifugals, each with its attendant woman with her tray which was filled by having the sugar *lifted* into it. Then she had to start, with a huge tray of sugar on her head, for quite a long walk, part of which would be up a steep flight of stairs. When I first came to this country, I once asked a sugar curer boss why *women* were always employed for this work, and my English ears were startled by being informed, 'Boss! you doesn't know that women's necks was made to carry weights.'

When the sugar gets into the store, it falls on to a sifter, which arrests any lumps. Twenty years ago it was tossed about by spades, and there was a ridiculous idea current the other side of the Atlantic that the lumps in the sugar were caused by the trampling of the bare feet of the labourers. I remember one estate that used to provide a sort of canvas boot for the feet of those employed in the sifting and filling of the sugar. I think that these boots were probably much dirtier than the feet that they covered; for after all, in those races that do

not cover their feet, the feet are no dirtier than our hands. And so there is quite as much dirt in a loaf of bread as ever there is in a ton of sugar.

The next step is the packing of the sugar. What an improvement is there here! Twenty years ago the sugar was packed in unsightly and unwieldy hogsheads, which for some occult reason were lined with blue paper, which was never seen by the consumer. Now the sugar goes in bags, all of which are filled to exactly the same weight. This department still has very much room for improvement, for, as far as looks go, there is very little to choose between the old fashioned hogshead and the modern bag, but the bag is much handier, and moreover costs very much less.

Having made a hasty run through the sugar factory, let us return and see what becomes of the megass.

Twenty years ago, it would have been received by a gang of 'boxmen', who would have packed it in wheeled trucks, and shoved it along an elevated level plane; it would have been dropped into the logies, there it would have been packed tight, to remain till it got dry, when, if it had not been burnt by spiteful labourers or carpenters out of work, it would have been carried on women's heads to the stoke hole and finally burnt under the copper-wall.

Now it is received on a carrier that hangs from one wheel, and this carrier is so light that one man can run about with it with the greatest ease; this tips the megass over a hole which leads to the grates of the boilers, and a man shoves the megass down to its last home.

Twenty years ago the megass was lifted breast high and shoved into a hole. The strongest man could not make

fire for more than a few hours at a time, and then wringing wet and thoroughly exhausted he had to be relieved; now one rarely sees a wet shirt. The army of boxmen shoving the trucks, and girls carrying the megass to the stoke hole, are no longer required; the estate saves about $2 a ton in wages, and if the factory is well arranged, and the juice fairly good, no other fuel than megass is required.

I said at the beginning of these papers that no regard should be paid to anything but dollars and cents, but here I must digress and point out the enormous improvement in the *comfort* of the present system of sugar making. Who that has ever had to keep a watch in the old time buildings can ever forget that copper-wall? Especially towards the end of the crop. The estate could not stop, the rains had begun, and the canes were beginning to take a 'second spring'; besides there were reasons connected with the estate's finance and the rotation of the crop which compelled the manager reluctantly to go on with the sugar making. The dams are bad and the mules fagged out, the megass is only half dry, and it is a miserable work. To give an idea of the worst, let us imagine a Saturday night towards the end of December. The estate has been grinding for some months, the rain is falling heavily, and owing to the weather, and the dams being deep in mud, it is late before the number of clarifiers set as the day's task is filled.

It is about eight o'clock in the evening, and the mill has just stopped. The coppers on the wall are boiling heavily, the fuel is 'heavy' and the flues are not clean. All the clarifiers are full, there is no room for syrup, and the pans have as much as they can do to convert all the thin syrup that is already in the subsiders into sugar

before morning, therefore all the syrup that is now 'sent up' must be boiled sweet, as it will have to be kept till Monday morning. The manager looks in at about nine, and says that all the syrup must be boiled to a density of at least 18 Bè.; he gives a general look round, bids 'good night' which sounds bitter irony, and goes to his bed.

It is sometime before the flooded wall begins to get sweet or any syrup to be sent up. Then there is a cry from the stoke-hole, and the overseer goes to see what is the matter and finds that there is not an atom of megass. This means a walk through the pouring rain to the logie, and a grand routing up of the megass carriers, who, poor things, have been hard at work for about eighteen hours already. The driver wakes up from a half nap, and pretends to flog them all round with a piece of long megass. She wonders why they have been so long at their 'dinner', and says that they are 'real table people', the 'table' consisting of a saucepan, or calabash, and a spoon.

Presently the head boiler informs you that the liquor is only simmering, as the fuel is so damp, and he says that if you 'don't look sharp' you will have the liquor as red as blood. This means another trip to the logie, and there is a grand search to see if there is any dry fuel to be scraped from the outside of any of the pens. The procession of girls is seen in the dim light, they walk as close as they can to the building of the logie to avoid the mud, and the water from the eaves pours into their baskets; the distance is very considerable, and the megass, damp when it started, becomes positively wet before it reaches its destination. Something must be done. The head boiler suggests 'patent fuel.' Alas! there is none. A search

in the trench may bring forth a lump or two that has accidentally fallen from the punts that brought the last lot to the factory, but that does not last long. Another suggestion is made to mix in a few lumps of coal. This is tried and seems to be doing well, but it is soon discovered that it is clogging the grating bars. Meantime the density, of the syrup scarcely rises at all, and now and then the end teache positively 'goes down', *i.e.*, boils flat like water instead of in a foam like milk.

Then there will be a slight pause in the rain and the megass will be a trifle better. Then down comes another shower: still everything comes to an end in time. When the weary night has almost gone, and the twittering of the birds announces the approaching dawn, the welcome sound is heard 'Take water', which means that all the juice is on the wall, and the work is nearly done.

By the time everything is over, and the people are paid, it is broad daylight; and the weary overseer goes to his bed at about six o'clock in the morning, with the unpleasant consciousness that there are two boxes which only stand 17 Bè.; this will mean explanations, which will probably be received with a grunt, and the words 'well don't let it happen again.'

At breakfast the manager will ask at what time the fire was hauled, and will say 'I am glad that it was before the train passed up in the morning, it does not look well to be seen smoking on a Sunday.'

If this is unpleasant for the overseer who only occasionally has to take the watch, imagine what it must be for the labburers who take every watch. Every morning at three they had to turn out and work till generally, ten o'clock at night, or even later.

Compare this with the modern system on a well regulated sugar estate. If the buildings 'go through', there are double gangs; if not, everything stops within a few minutes of the cane mill. Even on Saturdays the factory is closed at about nine, and everything is turned not into syrup as in the old time, but into masse-cuite. The megass is green, and therefore it is always the same, and thus the fuel is of one constant quality and does not differ from day to day. The work is not nearly so hard; in fact, in the modern buildings, the only gang that has hard work to do is the cane throwing gang. They have each one to throw about 15 tons of canes breast high. There is no difficulty in manning such buildings. The overseer has not to tramp round the houses every morning to turn the people out.

I can remember when the buildings' overseer had to make out a list of those men who had been told off to man the factory, and give copies to each of the other overseers, so that if they did not go to the factory they got no other employment, even if they did not receive a summons to attend the Magistrate's court.

Another great advantage in the modern system is the removal of the everlasting anxiety about fire. The natural end of a logie, as of a theatre, was to be burnt. And to make matters worse, these fires were generally incendiary, so much so that they were always declared to have been done on purpose, and this caused much bad feeling between the employers and the employed.

In this sketch I have said nothing about diffusion, first because the subject is so important that it deserves an essay all to itself, and secondly because I know so little

of it. I hope, however, that such a paper will be written by some one who does know all about it.

I have said very little about the distillery, but this is far too big a question to be satisfactorily treated at the *end* of an article.

The Capitulation to the French, in 1782.

By N. Darnell Davis.

UPON the surrender of the Dutch Colonies of Demerara, Essequibo, and Berbice, to His Majesty's ships *Barbuda* and *Surprise,* in February 1781, Sir GEORGE RODNEY, then in command of the Fleet on the Leeward Station, wrote to the Lords of the Admiralty, that the Colonies taken, "in the hands of Great Britain, "if properly encouraged, in a few years will employ more "ships, and produce more revenue to the Crown, than all "the British West India Islands united." Great Britain was then at war with France, Spain, Holland, and the Revolted Colonies of North America. The Admiral, therefore, caused a squadron of small vessels to be told off for the protection of the captured territories.

On the 29th of January 1782, the British flag floated over the Dutch Colonies, then in the possession of Great Britain, and which were governed by Colonel ROBERT KINGSTON, of the 28th Foot, by a commission to him from General VAUGHAN, the military Commander-in-Chief in the West Indies, whose name is associated with Admiral RODNEY'S in various enterprises in the West Indies. In what was then called by Naval Officers "the harbour" of Demerara, lay a British squadron. These vessels were, the *Oroonoko,* the *Barbuda,* the *Sylph,* the *Rodney* and the *Henry.* The *Oroonoko* had been a Dutch merchant ship which had been purchased into the service. On her 'tween decks, the height of which was about four feet six inches, she had ten 9-pounders. These guns were very

old and extremely ill-fitted with Ordnance Stores; there being scarcely a powder horn, priming iron, crow, or handspike on board. On her upper deck were placed eleven 2 and 3-pounders, but these were entirely useless having no shot for them on board. Many of them were in so bad a condition that it would have been very dangerous to have fired them. She had only some twenty souls on board, all told. Such was the vessel which bore the pendant of Captain WILLIAM TAHOURDIN, the Commodore of the squadron, an officer with twenty years of Naval Service.* The Lieutenant's name was EDGAR. The *Barbuda* had four 9-pounders and thirteen 6-pounders. Officers, servants, and sailors, all told were 123. This vessel was copper-sheathed and a good cruiser. She was commanded by Captain FRANCIS PENDER, who regarded his ship as well found and fit for sea. His Lieutenant was JOHN WEBBER. The *Sylph,* cutter, had eighteen 4-pounders and 90 men. She, also, was sheathed with copper and a good cruiser. In command of her was Captain LAWRENCE GRAEME, whose Lieutenant was JOHN MCKEY. THOMAS COLLINS was Master. The *Rodney,* brig, had ten 4-pounders and four 6-pounders. She was badly found in Ordnance Stores. She had 48 men, not half her complement, and of these, many were Americans who took every opportunity to desert. This ship was commanded by Captain JOHN DOUGLAS BRISBANE, whose Lieutenant was named TUCKER. There was another vessel attached to the squadron, which had sailed out on the 25th of the month, with orders from the

* When Captain Tahourdin took command of the *Oroonoko* she had only five men. Three of these were prisoners, by order of Captain Thompson: one for murder; another for stealing Naval stores; the third, a Dutchman.

Commodore to cruise to Windward of Demerara to give intelligence if an enemy should appear on the Coast. This was the *Stormont,* a vessel of fourteen 4-pounders. She was extremely badly manned. Of 75 men, but 55 were fit for duty, including officers and servants. But few of the sailors could be trusted, they being chiefly Americans and Foreigners, whom Captain PAUL had been under the necessity of taking out of the prison at Barbados, to assist in navigating the ship.* Captain CHRISTOPHER PAUL commanded. Her Master, GEORGE WANKFORD, acted as Lieutenant. With the Commodore's permission, Captain BRISBANE of the *Rodney* had gone out in the *Stormont,* for the recovery of his health. A richly laden merchant ship, the *Otter,* was anchored near the ships of war.

There was no *Georgetown* in those days. There was then no town, properly so-called, throughout the agricultural settlements of Demerara, Essequibo and Berbice.

* To what desperate shifts the British Government was driven, during the war, for want of seamen, may be realised by reading the following extract from the *Diary and Letters of Governor Hutchinson*, Vol. II, pp. 263, 264, under date of 27th June, 1779 :—

"There are great endeavours speedily to man more English ships. "An Act passed suddenly to invalidate all protections against a Press— "to look back to the 15th. A stratagem was made use of the 23rd in "the evening. No seamen appearing anywhere, the Tower was "lighted up, and a report was spread that the King had removed Lord "North—that he was in custody, and that he was bringing down to the "tower. Many thousands collected on Tower Hill, expecting him. "Care was taken to block up the avenues with sufficient guards. Ten "or a dozen different Press-gangs came on suddenly and secured "several hundred, among whom were many masters and mates "of Colliers and other vessels, who were sent immediately down to the "Nore. Some have proposed pressing the crews of all privateers, in "which service it is computed 70,000 men are employed."

What was to become, and to be called, *Stabroek*, the germ of the "finest city in the British West Indies," was then only being talked about. Where Georgetown now displays itself, amidst gardens, palms, and a rich variety of tropical plants and trees, the land was then lotted out in plantations of coffee and cotton. The sea-wall was, of course, not in existence one hundred and ten years ago; and the sea had not then washed away the foreshore which, even within the memory of persons now living, formed a promenade in front of where the Band House now stands. What is now Young Street formed, in 1782, the back-dam of three plantations, which lay between the Demerara River and the lands of plantation *Thomas*. Within a mile of the point at the entrance to the River, on its Eastern bank, was a mud bank, which projected about 45 or 50 feet at right angles with that bank. It served as a landing place for the plantation of which it formed part. Upon this point of land was Fort St. George, so-called: a Battery which had been constructed the year before by Captain DAY, then of the *Barbuda*. Here, five guns pointed down the channel towards the sea. Three other guns bore abreast of "the Harbour." Four others pointed up "the Harbour." These guns were mostly 9-pounders. The space between them, on the three sides, had been partly filled up by mud and sand, forming embrasures of a kind. On the land side, a small bank had been thrown up, and was palisadoed with staves of casks, about three feet high. There was a ditch next the land, about ten or twelve feet wide, and about three or four feet deep. In the wet season there was a little water in the ditch; in the dry season none. To get from

the Fort to the mainland, one had to walk over a plank. This fourth side was entirely defenceless and exposed. It was commanded by four or five different buildings in its rear, which lay within a distance of twenty-five or thirty yards. An enemy taking possession of these houses, could pick off every man from the Battery, without having his own men the least exposed to view from the Battery or the Shipping. Captain PENDER, who commanded the *Barbuda* in January 1782, says that, an enemy that had once landed on the Windward Coast, could have had no difficulty in carrying all before him, "as they might have advanced entirely hid by the cotton "plantations, as near as the front dams of the estate, "which was about 80 or 90 yards from the Battery; "and from the front dam to the buildings, unperceived, "by keeping in their wake. Or, the enemy having ad-"vanced as far as the front dam; which was about eight "feet deep and upwards of twenty feet wide; might, by "following the direction of that dam, or ditch, have ad-"vanced entirely hid from sight, within 14 or 15 yards of "the Battery, and where no gun could be brought to bear "on them. Or they might, by crossing from this ditch "to a smaller one, at the back of Mr. BROOKS' garden "house, have come into the Battery."

With such force by sea and land were the newly captured settlements to be defended against all-comers. At sunset on the 29th of January 1782, there was nothing to cause apprehension that a foe might be approaching.

At about 1 o'clock in the morning, on the 30th of January, Captain PENDER was hailed by Captain TAHOURDIN, and desired, to come on board the *Oroonoko*, as soon as possible. Captain PENDER'S ship, the *Barbuda*, lay

next to the *Oroonoko*, so he was soon on board the latter. Then Captain TAHOURDIN told him that a boat had just arrived from the *Stormont*, bringing an officer with a letter from Captain PAUL with intelligence that the enemy had been sighted about 3 o'clock in the afternoon, a few leagues to Leeward of the River Berbice. Upon the haze clearing up, eight vessels had been discovered to Windward. On getting nearer they were made out to be three frigates, a cutter, and four brigs. Captain PAUL hoisted his private signal, but it was not answered. The *Stormont* then wore, and bore away under all sail for the Demerara, to give the alarm. On the *Stormont's* wearing, the enemy made more sail and stood after her. They chased until it became dark. By this time the *Stormont* had got nearly abreast the mouth of the Demerara. At about half-past 10 o'clock, it being then almost low water, she grounded upon a shoal which lay at the entrance of the river. The officer who brought this news said Captain PAUL expected the *Stormont* would float again when the tide flowed. Captain GRAEME, who had been hailed to come on board, had now joined his senior officers.

Captain TAHOURDIN ordered the alarm signal to be made by the *Oroonoko*, and sent carpenters on shore to cut down a remarkable tree which served as a leading mark for the channel into the river.* He desired Captain

* On the 6th of October, 1783, William Faden, Geographer to the King, published a Chart, executed by de la Rochette, of *The Coast of Guyana from the Oroonoko to the River of Amazons*, from the observations of Captain Edward Thompson of the Royal Navy, made in the *Hyæna*, "when he commanded in the Rivers Berbice, Essequebo, and "Demerari, and governed those Colonies after their conquest from the "Dutch." The following remarks made by Captain Thompson are

Graeme to shift the *Sylph's* berth nigher to the Fort, and in a line with the *Oroonoko*, and to go on shore and put the people that were there upon the look out.

The officer from the *Stormont* had been forthwith sent on to the Lieutenant Governor, with Captain PAUL'S letter, and with the like promptness Colonel KINGSTON came on board the *Oroonoko*. Here, he and the Naval Officers consulted upon the situation, and quickly took action. The Battery was arranged in the best manner for defence. A supply of ammunition was ordered for it. The ships were prepared for action. Mr. MATTHEWS the King's Pilot, was sent for to come on board the *Oroonoko*. The Lieutenant Governor gave peremptory orders for a number of negroes to cut through a dyke, forming part of a road leading from the Windward Coast, so as to impede the enemy's advance, if a landing were attempted at night. Of the five marines who took charge of the Fort, three were sent with some trusty negroes, as guides, to watch on the Windward Coast. They were to give the alarm if the enemy should attempt to land.

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taken from the letter press at the foot of the Chart. "About 6 miles "up, on the West side of the River, stands a remarkable lofty tree by "itself, the branches of which appeared to be withered, and 3 or 4 "miles above that there is tufts of Trees or Bush, which is very "remarkable. In running into the River, the leading mark is to keep "the withered tree on with the Westernmost part of the Tuft, or Bush, "which will carry you in the best water, and about mid-channel, "steering at the same time S. by W. by Compass. The breadth of the "channel going in is about two miles. Shoaling gradually on each "side the best anchoring ground is within the East Point, in 4 Fathoms "at low water, soft mud. Keep the Eastern shore on board, the "Western side being flat and short. It is necessary to weigh the "Anchors once every ten days, or they will bury so much as to "be supposed to be lost."

At half-past 5 o'clock the *Oroonoko* repeated the alarm signal. Daylight broke about the same time, when the *Stormont*, having floated and cut her cable, was observed coming in, firing guns, and making signal that the enemy were in sight. Soon afterwards they were seen from the *Oroonoko*, apparently two or three miles astern of the *Stormont*. Between 6 and 7 o'clock, the *Stormont* anchored near the other ships, and Captains PAUL and BRISBANE joined those on board the *Oroonoko*, whither Captain GRAEME had been re-called. At about 8 o'clock the invading squadron reached the river's mouth, when they hoisted French colours and anchored in a line across the channel. The lookout men from the mastheads of the British ships presently reported that they could see, over the neck of land, some fourteen boats, passing and re-passing between the enemy's ships and the shore to Windward, where they were landing their troops. Mr. MATTHEWS, the King's Pilot, came on board and reported that his house, which was about three miles from the Battery, had been taken possession of by the enemy, of whom about 300 had landed when he left. Some of the inhabitants on the Windward Coast were said to have gone on board the French Commodore's ship. Presently a Mr. BUTLER arrived, and told how the enemy's troops had taken possession of his estate and appeared to be on the move.

The result of the consultation among the Officers assembled on board the *Oroonoko*, was a decision that the Battery, in the state it then was, could not be of any service to the shipping. It was totally defenceless on the land side. At the back of it were a number of dwelling houses and other buildings, which entirely com-

manded the Fort. The ground at the back of it was covered with cotton trees and bushes, which would have effectually sheltered the enemy's troops, while the British sailors who were in it, must have been exposed to the enemy's musketry with hardly any means whatever of defending themselves. At most, it would not contain more than 60 men. There was no place in it to hold powder, and now it was the rainy season. There was not "a drop of fresh water within twenty miles." Captain PAUL was sent on shore to spike the guns and destroy the carriages. It was further resolved that on the enemy's advancing towards the river, the British ships should go farther up the river, and thereby pass a shoal which it was hoped the enemy's frigates would not be able to get over. Time might thus be gained to fortify some narrow part of the river. Meanwhile, the *Sylph* and the *Henry* had unsuccessfully attempted to get out, and to escape from the enemy, so as to carry the news to the British Admiral. The French blocked up the channel by which those vessels must have passed. After being fired at several times both vessels returned to their anchorage between 11 and 12 o'clock. At last Commodore TAHOURDIN sent off his Lieutenant, EDGAR, to Essequibo, with orders to take any vessel he could find there and proceed to Barbados without a moment's loss of time, with a letter to inform the Commanding Officer there of the situation.

Between 1 and 2 o'clock, it being about flood tide, the enemy's ships began to get under weigh, sailing for the river's mouth. The largest of the Frigates, having a broad pendant, was the leading ship. Until the Frigates had passed the shoal water, and the leading one,

l'Iphigénie, was nearly entering the river's mouth, the British ships kept their position. These then cut their cables and followed the *Oroonoko* up the river. They passed Diamond shoal when it was little more than half flood, and had just twelve feet of water. At about half-past 5 o'clock the vessels anchored in a line athwart the river, between Leeston's island and the Eastern Shore. The Commodore proposed to fortify this island, but when he and Colonel KINGSTON had examined it, the project was given up. It was found to be very low and swampy, and could be commanded by cannon from a point on the same side of the river where they had anchored. Besides these grave drawbacks, the ships grounded at low water. It was, therefore, decided to move the ships, with the next day's flood, as far up as the Sand Hills, the first rising ground in the river.

An officer named MASON had been left in the *Stormont's* boat, with orders from the Commodore to watch the enemy's movements. At about 7 o'clock that evening he rejoined the squadron, and reported that the French had all come to an anchor a little above the Fort, and had hoisted blue English ensign. At about 2 o'clock on the morning of the 31st, the First Clerk of the Secretary of Demerara, JACOBUS ANDRIESSEN, the younger, arrived with a letter from three of the principal members of the Court of Policy to the Lieutenant Governor. In this communication Colonel KINGSTON was informed that the Count DE K'SAINT, the French Commander-in-Chief, had summoned the Colonies to surrender in form: and, if this was not complied with by 8 o'clock that morning, he would immediately set fire to the estates of the English inhabitants. The coun-

cillors earnestly begged that the Lieutenant-Governor would send proposals of capitulation for the Colony, to save them and their property from the exigencies of war. The bearer of this letter stated that the French had come from Europe, and had been sent against these Colonies in particular: they had five hundred troops landed, and had taken possession of the houses on both sides of the River. He was sent back with a message at about 4 o'clock that morning.

About 11 o'clock on that day, the 31st of January, the Lieutenant-Governor sent proposals for the capitulation of the Colony alone, and not for the ships, to the Count DE K'SAINT. Mr. GARDNER, the Purser of the *Rodney*, took the proposals, with a flag of truce. For his own part, Captain TAHOURDIN declared his resolution to defend the ships as long as possible. He thought he could do so with success if the enemy were not able to bring their vessels over the shoals. The next thing was to get the ships up to the Sand Hills. The signals for weekly accounts had been made in the morning, and an order been given to put everybody at two-thirds allowance. Then, an order was given to Captain GRAEME to send 18 men and the Lieutenant of the *Sylph* on board the *Oroonoko*, which vessel had not men sufficient to weigh the anchor, and no Lieutenant or Master. Between 1 and 2 o'clock, the *Oroonoko*, *Sylph*, and *Stormont* got under weigh, it being the last of the ebb. About 3 o'clock the *Rodney* floated and followed them. The *Barbuda* still lay aground. As she lay there, the enemy's cutter was seen to pass the shoal, round Diamond point, and immediately after her came two brigs and then two frigates. Captain

PENDER now made the signal that the enemy were coming up with all sail. A squall of wind just then drove the *Barbuda* off the bank, when she floated. Her cable was promptly cut, and sail made in the track of her consorts. These had got a long way ahead: and, when the *Barbuda* anchored abreast of the Sand Hills, after dark, all hands were found at work. They had come to an anchor between 5 and 6 o'clock. Immediately on doing so, the Commodore gave orders to Captain GRAEME to take the Carpenter of the *Oroonoko* and a number of seamen, to clear away a place for getting up some guns upon the hill. Should the enemy's smaller vessels, which had heavy cannon, attempt to attack at their own distance, upon the flood, when the British could not have got nigher to them, these guns would defend the latter. But one of the *Oroonoko's* guns had been got out when Captain PENDER arrived with the latest news of the enemy, one of whose frigates had been in chase of him. Captain GRAEME, who was at the time at work on the hill, was now recalled; the men were sent to their ships, and the *Oroonoko's* gun was got on board. The Commodore ordered everything to be ready for action, being determined that, if the enemy's ships came up in the night, he should make what resistance was in his power. He ordered the *Henry*, with guard boats, to go down the River and endeavour to find whether the enemy had landed, as, in that case, they would entirely command the decks of the British ships with their musquetry. At about 10 o'clock, Mr. GARDNER returned from his mission to the French commander-in-chief. He reported that the Count DE K'SAINT would not read the proposals for the colony,

and would not treat with Colonel KINGSTON alone, but with him jointly with Commodore TAHOURDIN, and for the shipping as well as for the Colonies. In case of delay, the French would burn and destroy the houses and plantations of the English inhabitants. Mr. GARDNER further reported that the whole of the enemy's force had passed the shoal. He had been on board the Commodore's ship and the cutter. The armament, he said, had been fitted out in France on purpose for this expedition. It had sailed from Rochfort on the 8th of October, with a convoy, to Cayenne, where it had arrived on the 8th December. It consisted of two frigates, carrying twenty-six 12-pounders: one with twenty-four 6-pounders on her main deck: a cutter (a vast deal larger than the *Sylph)* with eighteen 9-pounders; two brigs constructed on purpose for River service, one carrying twenty-four 12-pounders, the other six 24-pounders, and an 8-inch mortar. Two transports carried 600 regular troops. Mr. GARDNER said the enemy's troops were a very little distance from the British ships on each bank of the River.

A Council of War was now called, at which the Lieutenant Governor was present. It was first considered whether, if by any means the enemy's troops could be avoided, a stand could possibly be made against their ships. On the British side the only vessels of force were the *Barbuda* and the *Sylph*. As to the *Oroonoko* she had only twenty-five men, including officers and seamen; and more than half of her guns were but 3-pounders, which were rendered useless for want of shot. The *Stormont* had, in all, but fifty-five men, who were mostly foreigners; and her guns were

but fourteen 4-pounders. The *Rodney* had not more than half her complement of men, and only her 4-pounders were serviceable. It did not appear that there was any prospect of making a successful resistance. Were the ships to move higher up the River, that might have put off the evil day; but, in the doing of it, the French Commander might have found the occasion for ruining the English planters, as he had threatened. The question of burning the ships was most seriously considered. This would have been carried into execution, had there been any place to retire to. The situation was such, however, that, having no intrenching tools, the British crews must have starved in the woods. To burn their ships, and then go down to the enemy for protection would, in the opinion of all, be highly dishonourable and not reconcileable upon any principle or precedent they knew of. The Lieutenant Governor was very solicitous for the safety of the Colony. It was unanimously agreed that more could be got for the King's service, and for the Colonies, by negotiating terms, than by resistance to so vastly superior a force as that which had been brought against them.

1st. of February. Early in the morning on the 1st of February, Lieutenant TUCKER of the *Rodney* was despatched with a Flag of Truce, and with joint proposals from the Lieutenant Governor and the Commodore, to the Count DE K'SAINT. At 5 o'clock that afternoon Lieutenant TUCKER returned. With him came a Flag of Truce from Count DE K'SAINT, brought by the Viscount DE LA BEAUME PLEUVENEL, Commander of *Le Chien Chassé*, the cutter, and by Monsieur

DE FAGAN. The French Viscount at first "talked high." He demanded that the British should surrender at discretion. Moreover, he said, the Count DE K'SAINT would hear of no terms till the ships were brought down to him and struck their colours. The British commander assured him that no such things should be done: that, rather than suffer such disgrace to the King's colours, he would burn the ships and take to the woods for subsistence. Then the French Officer said that he was Commissioned by the Count DE K'SAINT to propose a meeting with the Lieutenant Governor and the Commodore, at any house half way between the two forces, there to settle upon proper terms—that is to say, to secure the property of the inhabitants of the Colonies, and to provide for the transport of the ship's crews. This proposal was accepted, with the condition that no movements were to be made on either side for six hours after the interview, if the Count DE K'SAINT should not agree to the terms proposed.

2nd of February.—On the morning of the second of February, the Lieutenant Governor and the Commodore went down the River, to meet the French Commander-in-Chief. They placed a number of boats in sight of each other, which were to repeat a signal from the Commodore, which he would give if the French did not accept the terms offered, or if they proposed to move up the River. In either case Captain PENDER had orders how to act. The Commodore was astonished to find how very exactly the Count knew the condition of the British ships. In the evening Colonel KINGSTON and the Commodore returned to the squadron. The Commanders of the ships were imme-

diately summoned on board the *Oroonoko*, where they were informed of the highly honourable terms of surrender, to their great satisfaction, and soon the good news was spread to the other ships. The sailors were not to be kept prisoners, but were to be immediately sent to Barbados, with leave to serve immediately on board British Ships of War. This was a great point gained, as seamen were much needed by the war-ships in the West Indies.

3rd of February.—On the morning of the 3rd of February, as had been arranged beforehand, two of the French brigs sailed up to the Sand Hills to take possession of the British ships. By Commodore TAHOURDIN'S orders, all of his vessels discharged their cannon and musquetry and struck their colours.

When Sir GEORGE RODNEY, then the British Admiral in command on what was then called the Leeward Islands' Station, received the news of the surrender of the Ships and Colonies, he could not understand how six British ships should have been given up to a French squadron without a blow. He wrote Home that he should know the reason why. In May following, Captain TAHOURDIN was, accordingly, tried by Court Martial on board the *Barfleur*, Sir SAMUEL HOOD'S ship, in Port Royal Harbour, Jamaica, when he was honourably acquitted. Many of the inferior officers and seamen of his squadron, for whom he had obtained such favourable terms and helped from the Count DE K'SAINT, served in RODNEY'S fleet, to gain his great victory over the Count DE GRASSE, off Dominica, on the 12th of April 1782.

(Admirals' Despatches, Leeward Islands 1781–1788 Vol. 10.)

The French and English Squadrons at Demerary, when the latter surrendered to the Forces of His Most Christian Majesty, the 3rd day of February, 1782.

FRENCH.

Ships.	No. of Guns.	Weight of Metal.	No. of Men.	Commanders.
L'Iphigénie ...	32	26 { 12 Pounders. 6 { 6 „	350	Comte. de K'Saint
L'Amable	32	26 { 12 „ 6 { 6 „	300	Chevr. Susannet
Le Rossignole ...	24	6 „	200	Chevr. de K'Saint
Le David	24	12 „	120	Monsr. Dombidau
Le Chien Chassé ...	18	9 „	180	{ Viscount de la Beaume Pleuvenel
Le Cæsar	6 {	24 „ & 1 9-in. Mortr. }	100	Monsr. Girare
	136	Guns and Body of	1250 near	men with a 600 Land Forces

ENGLISH.

Oroonoko	21	10 { 9 Pounders. 11 { 3 „	25	Capt. Wm. Tahourdin
Barbuda	17	13 { 6 „ 4 { 9 „	123	„ F. Pender
Sylph	18	4 „	90	„ L. Graeme
Stormont	14	4 „	75	„ C. Paul
Rodney	14	10 „ 4 „	48	„ J. D. Brisbane
Henry	6	4 „	15	Lieut. Rothery
	90	Guns and	376	men

French Soldiers.

		... 6-24 Pounders	... 14-9 Pounders.
350	Duc de Lauzun's Regt.	...76-12 „	... 17-6 „
100	Foris	...18-9 „	... 48-4 „
120	From Cayenne ...	...36-6 „	... 11-3 „
100	Marines	——	——
		136	99
670		and 1-9 Inch Mortar	

The Census of British Guiana, 1891.

By E. D. Rowland, M.B., C.M.

THE limited circulation, and the still more limited number of readers of Mr. DALTON'S Census Report together with the scant notice which it has received, will I think be sufficient reason for my drawing attention in this Journal to some of its more important features. The report itself is a very short statement of the general results, extending to only some six and a half pages, with six pages of what are called summaries, and a number of more or less elaborate tables. These last are arranged primarily on the territorial divisions of the colony and sub-divided as to town and county. Finally a series of abstracted tables are given together with a few tables dealing only with the East Indian portion of the community. It is much to be regretted that Mr. DALTON has not been able to see his way to displaying some of the principal results of the Census by diagrams similar for instance to those given in the Census Report for the United States—the graphic method of displaying statistical results being, without doubt, much more readily apprehended than the bald statement of numbers. An outline map or two of the colony shaded so as to display results would have enhanced the value of the report.*

The Census was made under a special Ordinance, No. 21 of 1890, and the enumeration was for the 5th

* Unfortunately owing to their prohibitive cost, certain coloured diagrams which had been appended to this paper by the author, have had to be left out.—ED.

April, 1891. This was the first time the work was done by the General Register Office of the colony; the former method of nominating special Census Boards for each county, to work under the direction and supervision of the Government Secretary, having been abandoned. The Combined Court voted a considerable sum of money to defray the necessary expenses, and Mr. DALTON states that he had drawn up a table showing the actual sum spent and the cost of enumerating and tabulating each person, but this has not been printed. The printed forms used weighed two and a half tons. There were 211 Commissioners and 1,078 enumerators employed. The last householder's schedule was received by the Census Office on the 6th of May. Considering the difficulty of communication with the interior of the colony, this despatch must have required a considerable amount of energy. An abstracted return of the population was finished and laid before the Court of Policy by the Census Officer on the 11th of May. In his report the Registrar General gently hints at a want of accuracy in some of the returns.

The first Census of the combined three counties of the colony was made in 1841, some years after the union of the counties under the style of British Guiana. At the period of the union, March 1831, an estimate of the population, says the Editor of the Local Directory for 1891, can be formed from a census of the free population which had been taken for Demerary and Essequebo on October 31st, 1829, and for Berbice on October 27th, 1827, together with the slave registers of the three counties. There was some diminution in the number of slaves in Essequebo and Demerary to the extent of 2,600, so that the population in March 1831 was not

more than 98,000; of whom 15,000 constituted the town population and about 83,000 the rural population. The race divisions at this time were simple; 89·4 per cent. were blacks; 7·5 were coloured and free blacks, and 3·5 were white.

The subjoined Table taken from the British Guiana Directory for 1891, gives the details, which are interesting. It may be accepted as fairly accurate and as giving us something to start from.

	Whites.			Free Coloured and Black.			Slaves.			Grand Total.
	M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	
Georgetown	962	858	1620	1625	2743	5988	3209	3407	6616	12604
Demerary County	662	110	772	463	617	1852	33883	28869	36199	41051
Essequebo	476	138	614	442	470	1526			28553	25079
Total	2100	906	3006	2530	3830	9366	37092	32276	71368	78734
New Amsterdam	130	48	179	324	530	1033	695	681	1376	2409
Berbice County	289	55	344	180	177	651	10202	8540	18724	19375
Total	419	104	523	454	707	1684	10897	9221	20100	21784
Total British Guiana...	2519	1010	3529	2984	4537	11050	47989	41497	89468	100518

The Census of 1841 gave a total population of 98,154, so that in the ten years 31–41, there was a reduction in the numbers. During this decennium, I find the recorded number of immigrants to be 9,018. Of these 429 were Madeirans, or, as they are now called Portuguese, and 406 were East Indians. The remainder was formed of Black West Indian Islanders, with the exception of 91 Blacks who had come direct from Africa. So that at the Census of 1841, there were already traces of what is now called our immigrant population.

In 1851 the total population was found to be 135,924 an increase of 37,770 on the figures of 1841, although

immigration was now well established and had brought in the ten years, 43,314 persons, mostly East Indians, as well as a considerable number of Portuguese. The percentage composition at this time became more varied. The Census gave 62·1 per cent. as Creoles, using this term to mean "born in the colony," irrespective of racial parentage. There were 1·5 foreign born Whites. The Portuguese and East Indians claimed 5·8 and 5·6 per cent. respectively—this last race being very nearly divided as to their origin from Madras or Calcutta. The other foreign born element was for the most part African Blacks, there being 14,551 of these or 10·4 per cent. of the whole population. The West Indian Islanders now numbered 9,278 persons or 6·8 per cent.; while the Aborigines, Seamen and Military numbered together 8,229 or just over 6 per cent. At the end of the next decennium 1861, the population had reached a grand total of 155,907—an increase of only 19,983 in the face of 39,207 immigrants brought to the colony in this period, composed of 9,589 Madeirans, 23,381 East Indians, 2,568 Africans and 3,283 Chinese. During this decade three fatal disorders are recorded as afflicting the country—yellow fever from 1851 to 1853; small-pox in 1855 and 1856, and cholera in 1856, and 1857—and so perhaps explaining the limited increase of the inhabitants at the time of the Census enumeration. The percentage composition of the population at this Census was as follows:—the creoles, excluding Aborigines, formed 60·2 per cent; the West Indian Islanders 5·3; the Portuguese 63; Africans 5·9; Natives of Madras 2·9; Natives of Calcutta 11·1. The total Coolie proportion was hence 14 per cent. The Chinese claimed 1.7 per

cent, and the Aborigines, who then numbered 7,000, were a little over 4 per cent.

At the 1871 Census the population had risen to 183,491 an increase of 27,584 on the figures of the previous enumeration. Yellow Fever raged continuously in the colony from 1861 to 1866. The immigrants for the decennium reached the large number of 61,124 persons, composed of 10,130 West Indian Islanders; 1,533 Madeirans; 38,715 East Indians; 1,403 Africans and 9,343 Chinese. The percentage composition of the people shews the effect of immigration conducted on such a magnificent scale, for I find that there were 3·4 per cent Chinese; 17·8 East Indians; 7·2 West Indian Islanders, and 61·8 creoles. The mortality must have been very high at this period to result in only an increase of 19,000 with such a large number of immigrants, even after deducting the returned immigrants, the number of whom I find to have been 2,773. At the next Census in 1881, the figures showed a great improvement. The population had risen to 252,186, an increase of 68,695 on the previous Census with an immigration for the ten years of 73,787, divided into the following. There were 12,837 West Indian Immigrants; 2,170 Portuguese; 57,887 East Indians and 903 Chinese. The returned immigrants numbered 8,879, so that some of the increase was due to the excess of births over deaths during the decennium. The effect of the continued immigration is seen in all the results of this Census. There were only 59·2 per cent of Creoles, and the East Indians had risen to no less than 25·5 per cent. There were 1·7 Chinese; 2·7 Portuguese; 7·2 West Indian Islanders; ·5 Europeans, and 2· Africans only.

Population.	Immigrants.	Increase.
	34,266	
	34.000	34.000
	33 000	33.000
	32,000	32.000
	31,000	31,000
	30 000	30,000
	29,000	29,000
	28,000	28.000
		27,884
	27,000	27.000
		26,142
	26,000	26 000
	25,000	25,000
	24.000	24.000
	23 000	23.000
	22,000	22.000
	21,000	21.000
	20,000	20 000
		19,933
	19,000	19 000
	18,000	18,000

Finally the 1891 Census, which I propose to examine in this article, gives a total population for the colony of 278,328 being an increase on the figures of 1881 of 26,242 or 10 per cent., with an immigration of 34,266. The increase is due to the excess of births over deaths during the decennium which was over 6,000 in round numbers (the exact figure I cannot find), and the excess of Immigrants remaining after deducting those returned to India for this period. A large number are recorded as having returned to their native country, some 16,849 in all I believe. Thus the broad feature remains that 3–4ths of the increase of the population for the last ten years is due to immigration, and 1–4th to the excess of the births over the deaths.

The annexed diagram shows very clearly the exact influence of immigration on our rate of increase. It is clearly shown how closely the curve of increase follows the curve of Immigrants, and the steady rise in the number of the people is directly proportionate to the number of persons brought to the colony.

The fall for the decennium ending 1891 in the number of immigrants brought to the colony is closely parallelled by the curve indicating the fall in the rate of increase in the population. It is difficult in the face of this diagram to understand, how it could ever have been maintained that the excessive birth rate (!) was the chief factor in the growth of our population. From a careful examination of the figures I have found nothing to indicate a very high birth rate in this colony. From the figures of the Census Report and the Registrar General's Annual Report, I find that *7·6 children were born to every 100 women* in

the population aged between 15 and 45 for the year 1890.

In England 12 children are born annually to every 100 married and unmarried women.

The total number of people given by the Census Enumerators was 3,775 less than the estimated population given in the Registrar General's Annual Report for 31st December 1890 This number spread over the ten years gives an annual error of 377 in excess. No explanation of the disagreement in the two totals is given in the Census Report, but in the Annual Reports of his Department by Mr. DALTON, I note that he draws attention from time to time to the fact that comparatively large numbers of persons leave the colony unregistered; and these not being deducted from the Annual Estimate an error must arise. It is not a matter of grave importance perhaps, for after all the error is not large.

Mr. DALTON adds 10,000 Aborigines, estimated as wandering about the interior of the colony, to the 278,328 given in the Schedules, but in all the tables and calculations of the report these are disregarded. The increase in the population was diffused over the whole colony, every portion more or less sharing in the increase in the number of inhabitants. Generally speaking, those districts in which the Coolies settle showed the greatest increase.

The distribution of the population over the colony is very irregular. Along the coast there are the two large centres, Georgetown and New Amsterdam, with thin lines of population running away from them along the sea border and up the rivers for limited distances. These lines show here and there some thickening more especially in the neighbourhood of the Sugar Estates. In

the higher reaches of the rivers and creeks the population is very scattered, occurring here and there in small isolated settlements; and the plains of the interior may, I am informed, be looked upon as quite uninhabited. In the capital of the colony there were 53,176 persons, divided into 24,821 males and 28,355 females, comprising some of all the various races that inhabit the colony. These races may be shortly given as:—Europeans other than Portuguese, 1,583 males, 1,290 females; Portuguese, 2,784 males, 3,182 females; East Indians, 2,618 males, 1,358 females; Chinese, 443 males, 72 females; Africans, 167 males, 162 females; Blacks, 10,855 males, 13,412 females; Aborigines, 63 males, 71 females; Mixed races 6,235 males, 8,663 females; and other races to the number of 70 males and 81 females. In New Amsterdam, the other town of the colony, there were 8,903 persons, being an increase of only 779 on the population of 1881. The sexes were more nearly equal than in Georgetown, being 4,324 males and 4,579 females. As to the races there were 141 males and 105 females from Europe, other than Portuguese; 189 males and 197 female Portuguese; 842 male and 420 female East Indians; 212 male and 102 female Chinese; only 25 male and 19 female Africans; 2,094 male and 2,594 female Blacks; 2 male and 3 female Aborigines; 786 male and 1,096 female of mixed races; with 33 male and 43 female of unstated races.

The County of Demerara including Georgetown contained no less than 175,868 inhabitants divided as to sex into 91,975 males and 81,923 females. As to races there were 2,178 males and 1,576 females from Europe, excluding the Portuguese. There were 5,113 male and 5,377

female Portuguese; 38,198 male and 24,436 female East Indians; 1,726 male, 766 female Chinese; 944 male and 542 female Africans; 33,203 male and 36,214 female Blacks; 1,281 male, 1,072 female Aborigines; 9,223 male, 11,825 female of mixed races, with 110 male and 115 female of races not stated.

The County of Berbice including New Amsterdam, contained 51,176 persons or 2,000 less than Georgetown alone and 2,078 less than the County of Essequebo. These as to sexes are divided into 27,658 males and 23,518 females; while as to race there were of Europeans other than Portuguese, 266 males and 150 females; of Portuguese there were 376 males and 329 females; of East Indians, there were 12,464 males and 7,863 females; of Chinese there were 511 males and 233 females; of Africans there were 543 males and 463 females; of Blacks there were 11,015 males and 11,808 females; of Aborigines there were 502 males and 469 females; of mixed races 1,946 males, 2,153 females, and of races not distinguished 35 males and 50 females.

The third County of the Colony, Essequebo, including the North West Province and the Pomeroon, has a population of 53,254, which is 78 more than the population of Georgetown and 2,078 more than the County of Berbice including New Amsterdam. Divided as to sex there are 32,126 males and 21,128 females. With regard to race the divisions are as various as in other parts of the colony, and can be given shortly as follows. Europeans other than Portuguese, 284 males, 104 females; Portuguese 543 males, 418 females; East Indians, 14,041 males, 8,461 females; Chinese, 346 males, 132 females; Africans, 625 males, 316 females; Blacks 12,079 males,

7,847 females; Aborigines, 2,134 males, 2,005 females Mixed races 2,058 males, 1,824 females, and 16 male and 21 female of other races not distinguished.

With regard to the North West Territory, at the 1881 Census there were no returns, but now the population is given as 942.

The population is distributed in the following manner according to the Census: 19·1 per cent live in Georgetown; 43·3 live in the County of Demerary excluding Georgetown—if the town and county be taken together 62·5 per cent live in this division of the colony. Essequebo claims 19·1 per cent and Berbice 18·3 of which 3·1 per cent. live in New Amsterdam. Put in a more general way it may be stated that 22·2 per cent of the people live in towns; 32·5 on the various estates of the colony; and 45·1 in the villages. The villages are all comparatively small and become smaller in proportion to their distance from Georgetown. Those on the East Coast of Demerara near Georgetown are the most thickly populated; and of these Plaisance is the largest with 4,705 inhabitants. The villages in Essequebo are small, the largest being Queenstown with 2,096 persons and those in Berbice are smaller still. Cumberland is the largest but has only 1,250 inhabitants. The density of the population in the usual sense is not great; but a mere statement of this fact gives rise to misapprehension for there are such large tracts of land uninhabited, and there is no exact measurement of the inhabited area. The density for Georgetown is given by Mr. DALTON as 53·17 persons per acre, and of New Amsterdam as only 28·08. But this even does not give any idea of the enormous amount of over crowding that exists at night in the houses of

the towns. It would seem that the floor space is often the only limit and no great regard is paid to the separation of the sexes. I strongly suspect we are not much better than Barbados in this matter

The returns of the enumerators give 54,602 inhabited houses, 1,504 houses in course of construction, and 3,823 houses unoocupied. This gives an average of 5 persons to each inhabited house. It is difficult to judge of the accuracy of this return, for the enumerators had evidently vague ideas as to what constituted a house, so much so that the Registrar-General places no reliance on these figures. I can sympathise with the enumerators: the term house is difficult to apply in this colony.

A certain number of persons (the figures are not given) were returned as sleeping in the open, and 582 persons slept in the crafts on the rivers and 15 at the Light-ships.

The races of our population. Starting in 1831 with an almost entirely black population (with 89·4 black and 7·5, per cent. coloured and black), we find, 60 years after, under the influence of Immigration, a curious mixture of races in the 1891 Census.

The figures are:—Europeans other than Portuguese 1·637; the Portuguese 4·371; the East Indians 37·891; the Chinese 1·334; the Blacks 41·528 per cent. These can be divided into 1·233 for Africans and 40·295 for other Blacks. Mixed races are as high as 10·429 and the Aborigines are only 2·681. Other races are just represented, being only ·12 per cent of the whole population. Divided as to creoles and foreign born, Mr. DALTON gives 170,106 as natives of the colony. He gives the increase of the creole population as 20,467 for the decen-

nium or an increase of 13·6 per cent on the creoles numbered in 1881. The parentage of the creole population can be found from the table on Page 59 of the Report. I give it in percentage as creoles of European parentage other than Portuguese 1·2; of Portuguese 3·9; of East Indians (Madras being only slightly represented) 19·6; of Chinese ·7; of Blacks 56·6; of mixed 14·2; and of the Aborigines 4. The sexes in the creole people are 49·1 males to 50·9 females.

The following table gives the figures of the various races for the five last decennial periods and is worth some study :—

TABLE GIVING DETAILS OF THE RACES AT CENSUS TAKINGS FOR 1851, 1861, 1871, 1881, 1891.

	1851	1861	1871	1881	1891
Natives of British Guiana	86451	96861	113861	149039	170109
West Indian Islanders	9278	8309	12385	18318	15972
Africans Immigrants	7168	9299		5077	3423
Africans prior to Abolition	7063				
Portuguese	7928	9859	7925	6879	5378
Whites, (Natives of Europe, &c.) ...	2088	1629		1832	2533
Coolies from Madras	3665	3664	32681	65164	2663
Coolies from Calcutta	4017	18416			70348
Aborigines, Seamen, &c.	8229	7000		7762	7463
Others	17	369	9635	897	337
Mixed Races					
China		2629	6296	4293	5062
Military and Seamen...		881			2475
Total	135924	155907	183491	252186	278328

The whites other than Portuguese by the Census figures form a very small proportion of our population, having only a percentage of 1·637, and this is probably too high. They number in all 4,558 persons divided into

creoles 2,025 (947 males and 1,078 females) and 2,533 foreign born (1,781 males and 752 females). Creole whites form 1·2 per cent of the creole population and 44·4 per cent of the total white population. The sexes are unequal. In the immigrant whites the males are largely in excess, while in the creole, the females are in slight pre-dominance.

The Portuguese at a former period were more numerous than at present; it would appear that what they have gained in position they have more than lost in numbers. From 1835 no less than 60,653 Madeirans have come to the Colony and yet their total number in April 1891, was only 12,166 or only 4·371 per cent on the total population. This number is nearly equally divided into creoles and foreign born. The numbers are for creoles 6,788 (3,296 males, 3,492 females) and foreign born 5,378 (2,746 males and 2,632 females). The creole Portuguese form 3·9 per cent of the creole population and 55·7 per cent of the total number of the Portuguese. The creole Portuguese, at the 1881 Census, number 5,047 persons, but there is reason to question the accuracy of this return.

The East Indians number 105,463 or 37·891 per cent of the whole population. The number of this race has risen rapidly to its present condition under the constant stream of immigrants that have, since 1845, been poured into the country, no less than, in round numbers, 170,000 souls having been landed here from India. Of course a considerable number have been returned to India; the total number of these I find may be taken as 33,000. There are two great sub-divisions of the East Indians, Calcutta and Madras; but these last only number 3,993,

so that they are hardly appreciable. The Calcutta coolies number 101,470 persons, divided into 31,122 creoles (16,366 males, 14,756 females) and Indian born 70,348 (45,963 males and 24,385 females); 12,732 of these are given in the report as indentured to the Sugar Estates. The creole Coolies form 19·6 per cent of the creole population and 29·5 per cent of the Coolie people. So that there are 11.1 per cent of creole Coolies to the total population with the important condition of having the sexes almost equal. The creole Coolie, as far as my experience goes, is a creole first and then a coolie. As a rule he has fair muscular development, being much better favoured in this respect than his father. He is intelligent and a law-abiding citizen. Further I am informed, and it is within my own knowledge, that he is more and more pushing other races out of the special work of estates. I am told he works better, more intelligently, and is more to be depended upon than some of the other races. He himself wishes to become wealthy and is willing to do work to this end. In short he is ambitious and therefore in the future will play a larger part than he has done in the past in our social condition. My own impression on this matter is that if coolie immigration is maintained in the future on anything like the scale it has been in the past we are quite within a measurable distance of the time when our people shall be almost wholly East Indians. And if by any means more coolie women could be persuaded to accompany the men to this colony, this probability becomes almost a certainty. The same end might be reached by buying from the time expired immigrants, with land, their claim to a free passage to India. In the 1881 Census there were

only 14,768 creole Coolies, but this was probably not correct.

The Blacks at present claim the largest proportion of our population. They are given by the Report as being 41.5 per cent of the total population, and of this 1·2 per cent are African born. They number 115,588, which is only 10,125 more than the whole of the East Indians. Their number can be divided into 96,282 creoles, 3,434 Africans and 15,973 born elsewhere, mostly in the West Indian Islands. I may remark that the slave register of 1829 and 1831 gave the number of Blacks as 89,468, and at that time there were already some free blacks in the colony, so that 90,000 may be taken as the black population at the time of the union of the Counties. During the sixty years that have elapsed, it is recorded that 39,839 blacks have been brought from the West Indian Islands and 13,355 blacks from Africa, in all a total of 53,194 and yet our black population is only 115,588. Further the original 90,000 blacks were nearly equal as to sex, there being in round numbers 48,000 males and 42,000 females. I have not found any records of how many of the 53,194 immigrant blacks were returned to their homes. The creole blacks form 56·6 per cent of the creole population and 83·2 per cent of the blacks are creoles; the creole blacks to the total population being 34·5 per cent. The Africans born are, as is natural, rapidly dying out, none having been brought to the colony since 1865. It is to be regretted that from the manner in which the 1881 Census was taken, it is impossible to say positively if the creole black is increasing. My own opinion is that at best he is only holding his own with difficulty. I may here express a hope that the next Census will be taken

so that a comparison can be made. The present tables should be maintained and new ones added as is necessary. The old tables should not be altered at all, for it is only by maintaining a definite plan that the Census results can yield the information we all so much desire. The mere enumeration is almost the least useful part of such reports.

The Chinese form only a small and diminishing proportion of the population. In all 13,534 Chinese immigrants have reached these shores, the last ship bringing 515, coming here in 1878–1879 season. This race now numbers 3,714 persons, divided into 1,239 creoles and 2,475 immigrants. The creole Chinese only form ·7 per cent of the creole population. The sexes for the whole Chinese population are 2,583 males and 1,131 females.

The mixed races are for practical purposes a varying degree of black and white. They number 29,029 or 10·4 per cent of the total population which is probably an understatement of the true condition. This race division is remarkable for being the only class in which the female exceed the male immigrants. The figures are for those born outside the colony, males 2,388 and females 2,664, while for the creoles there are 10,839 males and 13138 females. The creoles of mixed races form 14·2 per cent of the creole population. This racial subdivision will probably form a larger proportion of our people in the future.

The Aborigines number on the schedules 7,463 or 3,917 male and 3,546 females. To the total population this is 4 per cent. The Registrar-General gives 10,000 more of this race as estimated to be wandering about the interior of the colony. The number on the schedule

shows a decrease on the figures of 1881, when 7,762 were returned. This race is of little or no social value and their early extinction must be looked upon as inevitable in spite of the sentimental regret of Missionaries. At the same time it is unnecessary to hasten the process in any way, for in this matter, nature, as ever, is much more gentle than man.

Other races not noticed above form a small proportion of our population numbering only 347. At page eight of the report Mr. DALTON states that Her Majesty's subjects in the colony number 262,328, and that 16,241 of the population belong to Foreign States. These are 12,166 from Portugal and Madeira; 3,714 from China; 50 from Germany; 55 from France; 8 from Italy; 29 from the United States; 48 from Holland; 28 from Sweden; 21 from Denmark; 36 from Venezuela; 1 from Austria; 3 from Belgium; 4 from Spain; 4 from Turkey; 3 from Switzerland; 11 from Russia; 2 from Syria; 8 from Arabia and 1 from Greece.

The sexes of our population are given by Mr. DALTON as 151,759 males and 126,569 females or 54·5 per cent males and 45·4 per cent females. This is 100 females to 119·9 males and not 112 males as given in the report. Reversed the figures are 83 females to 100 males. The disproportion of the sexes shown by these figures is nothing new or extraordinary, it is of necessity attached to all comparatively new countries and to countries so dependent on immigrants as we are. So further one is not surprised to find the disproportion of sex most marked in the East Indian Race. The principle governing the proportion of the sexes in a country such as this would seem to be the permanancy or not of the home. This

of course does not entirely apply to the Coolie population. For them the proportion of women brought to the colony is laid down by statute. Commencing, as immigrant populations almost all do with a large preponderance of the male element a gradual change is produced; the female element slowly increases until a varying time after the establishment of a permanent home, the female element comes to be the largest numerically. The figures of the Census Report bear this out in a remarkable manner with only one exception, in the case of the foreign born of mixed races, in whom contrary to rule the female element is in excess. Georgetown particularly, from the returns, would appear to possess some peculiar attraction for foreign born women of mixed races.

The relation of the sexes for the whole population is 54·5 per cent males, 45·4 per cent females, while for the whole creole population the females are in excess for all races. For creoles the percentage is 49·1 males and 50·9 females. The foreign born population have 66·3 males and 33·7 females. The Blacks have 50·5 males, 49·5 females. The East Indians 61·3 males and 38·7 females. The Chinese 69·5 males and 30·5 females. The mixed race 45·4 males and 54·6 females. The foreign born blacks have 59 males and 41 females, while the creole blacks have 48·4 males and 51·6 females. The Europeans other than Portuguese 59 males and 40·3 females, and the Portuguese 49·6 males and 50·4 females.

These figures show an improvement on those of the 1881 Census; then there were 140,134 males and 112,452 females, being 124·5 males to every 100 females. The percentage composition was then 55·5 males and 44·5 females. The improvement is not very marked for ten

years, but it is comforting to think that however slight it is in the right direction.

From the above figures it is at once seen that the males are in excess in the whole population and in all its race sub-divisions, with the exception of the mixed races where the women are largely in excess, and in the Portuguese where they are only in slight excess. Now it is almost as self-evident a proposition as it is an uncontrovertible fact that natural increase of the population depends on the excess of births over deaths; and that the number of births is regulated by the number of marriageable women in a population. Hence authoritative writers all lay it down that where there is a permanent demand for labour in colonies, men and women should be induced to immigrate in equal numbers. Colonies can only be planted by families; and the small number of women brought from India is the great blemish in our Immigration system. I am speaking of course only as regards the prospect of the colony as to its future population. It seems utter waste to continue year after year to import males to work here for a few years and then either to return them to their country or to the bourne from which there is no return passage. The position resolves itself into this, that under our present conditions a number of years must elapse before our population can become self sustaining; while if the sexes were more equal it would be so almost at once. Wise statesmen have long known that the unit of a country is a family and not an individual. In the Fourth Annual Report by FARR of the English Register's Office it was stated "that the population of the "West Indies can only be permanently augmented by "the immigration of females and males in equal num-

"bers." The experience of some fifty years has only proved the absolute truth of that learned statistician's prophecy so far at least as regards British Guiana. Lord BACON said, and its truth has never been denied, that the greatness of a State consisteth essentially in population and breed of men. So from every side we see the urgent need of increasing the number of women in the colony.

The ages of the people.—In the Census Report, on page 6, there is a table giving the sexes divided as to ages. Under 15 years of age there are 43,600 males and 43,073 females; under 20 years of age, there are 54,877 males and 55,190 females, and under 50 years of age there are 136,303 males and 113,909 females. The males have increased Mr. DALTON says by 8 and the females by 13 per cent during the decade.

The Registrar-General complains of the difficulty of obtaining the correct ages in this colony, and from my personal knowledge, I can bear out what he says. I am not now astonished to be assured that a baby in arms is 17 years old or that a dear old lady with grey hair has only seen some 20 summers.

The number at the different ages with the percentages is as below:—

Under 1 Year	... 5,400	... 1·9 per cent.
Over 1 „ and under 5 Years	... 23,786	... 8·5 „
„ 5 Years „ 10 „	... 30,348	... 10 6 „
„ 10 „ „ 15 „	... 27,199	... 9·7 „
„ 15 „ „ 20 „	... 23,334	... 8·4 „
„ 20 „ „ 25 „	... 30,123	... 10·8 „
„ 25 „ „ 30 „	... 29,092	... 10·4 „
„ 30 „ „ 35 „	... 25,058	... 9·0 „
„ 35 „ „ 40 „	... 22,696	... 8·1 „
„ 40 „ „ 45 „	... 19,490	... 11·9 „
„ 45 „ „ 50 „	... 13,685	

Over 50 Years & under 55 Years					...	10,364	...	5·6	,,
,, 55 ,,	,,	60	,,	...	5,226				
,, 60 ,,	,,	65	,,	...	5,078	...	2·6	,,	
,, 65 ,,	,,	70	,,	...	2,341				
,, 70 ,,	,,	75	,,	...	1,791	...	·9	,,	
,, 75 ,,	,,	80	,,	...	941				
,, 80 ,,	,,	85	,,	...	802	...	·4	,,	
,, 85 ,,	,,	90	,,	...	322				
,, 90 ,,	,,	95	,,	...	247	...	·1	,,	
,, 95 ,,	,,	100	,,	...	126				
Over ...	...	100	,,	...	62	...	·02	,,	
Not stated	...	...	...	...	115	...	·2	,,	

The number returned in the Census of 1891 as under 1 year old, 5,400 is in striking contrast to the number registered as born in 1890. In his Annual Report for 1890, the Registrar-General gives the registered births as 8,726. From this must be taken the 1,488 children registered as dying under 1 year old during the same period, thus leaving 7,238 children alive at the end of 1890. Now the births and deaths for the first quarter of 1891 may be taken as equal, so that I find 1,838 children under 1 year old, by the Annual Report unaccounted for by the Census enumeration. Further, one, if not two, coolie ships arrived early in 1891 bringing some children under 1 year old, and I do not know that any large body of persons left the colony during the same period. This of course increases the disagreement. Now if such a large error from mis-statement or otherwise can creep into such a small number as 7,238, what trust can be placed on the numbers returned at other ages, more especially perhaps in the periods of more advanced ages? Little or no reliance can be placed in them.

The conjugal conditions of the people.—The figures in

the report under this heading are to my mind almost valueless, and readers must remember that the words married and single must be taken only in the simple meaning of the word—as meaning nothing more than the performance or not of a special religious ceremony. Any further meaning, such as the words carry in England for instance, would give rise to grave error. Mr. DALTON gives for the ages of from 15 to 45, for women, 81,977 single 28,248 wives and 3,683 widows. Only 40,811 women of all ages of all races are returned as having passed through any marriage ceremony out of a total number of 126,569 females. Only 32·2 per cent of all the females of all ages of all races are returned as having married. But even this is an improvement on the returns of 1881 for then only 29·1 per cent were given as having passed through any marriage ceremony.

The position of the East Indian Immigrant as to marriage, Mr. DALTON says, is difficult to define. The matter ought not to be difficult, for if the men and women have passed through the particular ceremony of their race, whatever this may be, then it commends itself to one's sense of justice that they should be classed as married. This at all events, I am informed, is the custom in India.

The following tables give the married, single and widowed at the various ages for men and women :—

MALES.

	Married.	Single.	Widowed.
Under 1 Year ...	...	2,713	...
Between 1 to 5 ...	...	11,812	...
„ 5 to 10 ...	14	15,070	...
„ 10 to 20 ...	544	24,713	11
„ 20 to 30 ...	6,737	26,006	195
„ 30 to 40 ...	10,457	17,249	572

MALES.

	Married.	Single.	Widowed.
B'twn. 40 to 50 Y'rs	9,009	10,260	941
„ 50 to 60 „	4,446	3,891	724
60 to 70 „	2,022	1,456	562
„ 70 to 80 „	655	429	225
„ 80 to 90 „	227	122	107
„ 90 to 100 „	76	32	44
„ 100 and over	9	3	7
Ages not stated	88	313	18

FEMALES.

	Married.	Single.	Widowed.
Under 1 Year		2,687	
Between 1 to 5	5	11,969	
„ 5 to 10	41	15,223	
„ 10 to 20	2,681	22,553	3
„ 20 to 30	9,865	15,919	493
„ 30 to 40	9,515	8,763	1,198
„ 40 to 50	6,141	4,863	1,961
„ 50 to 60	2,748	2,010	1,771
„ 60 to 70	1,102	956	1,323
„ 70 to 80	331	389	703
„ 80 to 90	121	150	397
„ 90 to 100	39	45	137
„ 100 and over	6	9	30
Ages not stated	114	222	58

	Married.	Single.	Widowed.
Total Males	34,284	114,069	3,406
„ Females	32,709	85,759	8,102
	66,993	199,827	11,508

The percentage of the population under this head can thus be stated as being 71·7 per cent single; 24 per cent married and 4.1 per cent widowed. But Mr. DALTON tells us that these figures must be taken with considerable caution for some women it is to be feared "return themselves as wives without having any strict title to the

designation." A full table giving the conjugal condition as to the various races is required. The Registrar-General gives the proportion of married persons to the adult population as 35 per cent; of husbands there were 31 per cent and of wives 39 per cent. Of the enumerated wives 28,248 had not completed their fiftieth year. There were 34,284 husbands and 32,709 wives returned by the enumerators. The percentage of females, single, married, and widowed, from 15 to 45 years of age, to the total for this age, is, for all races, single women 71·9 per cent; married women 24·7 per cent; widows 3·2 per cent. And if these figures be taken as only approximately true it discloses a lamentable social condition which even FROUDE'S sophistry as to its being a state of innocence cannot reconcile one to. The fact remains that it is only where there is a permanent union of the sexes that children are properly cared for. It is only then that both parents share the duty nature has placed on them in this matter, and so only can human beings fitted to play any proper part in the world be raised.

The occupations of the people are somewhat limited, there being for practical purposes only one industry in the colony, sugar making. Some 105, 444 persons are returned as agricultural labourers, but no details are given as to the number employed in sugar growing and making only. Some of these agriculturists grow provisions, principally plantains, cassava and Indian corn, for the local market. A greater detail as to all the occupations is wanted in the Census report.

There were 56,663 children and persons of no employment, an increase of 10,509 on the figures of 1881 ; more particularly the females of this class have increased. The

increase of unoccupied females being no less than 7,083.

In the Public Service the numbers were 1,653, of whom only 73 were females; this is an increase of 480 persons or 20 per cent. on the 1881 figures. The clergy, learned professions and teachers, are now 1,470 an increase of 331. Merchants, shop keepers, and agents, have increased by 297. Clerks and shop assistants numbered 2,664, an increase of 996, while landed proprietors are 3,060 as against 2,195 in 1881. This must mean owners of small holdings, for from other sources it is notorious that large landed proprietors are diminishing. Mr. DALTON says that wood cutters have decreased while the gold-seekers and wood-cutters are together 6,646 or nearly double the figures given in 1881. Mechanics and artizans have increased from 10,086 in 1881 to 14,146 in 1891. This seems to me too summary a classification, a greater detail as to the precise work is required. Agricultural labourers divided as to sexes show a curious condition; the males have decreased in the last ten years from 67,392 to 64,282 while the females have increased from 40,833 to 41,162 or on the whole a decrease of 2,781 persons so employed. Other labourers variously employed increased during the decennium. Boatmen and mariners have decreased, while domestic servants, more especially the female division, have increased. Under the head of scholars there is a record of a diminution to the extent of 492; this, the Registrar-General explains, as due (1) to the less strict enforcement of attendance at the schools of the two towns, and (2) to the greater poverty of the parents.

As regards the amount of education as revealed by the numbers who can read or write, an additional column is

wanted on page 60 of the report to show those who can do both. Those who can read are given as 48,234 males and 43,206 females, being a total of 91,440. Those who can write are given as 40,598 males and 34,633 females, or a total of 75,231. This is an improvement on the census of 1881, when only 77,396 readers and 59,075 writers were numbered. Only 30·3 per cent of our population can read, and only 27 per cent are able to write.

Infirmities. Only those persons being patients in the Lunatic and Leper Asylums were returned under the heading of Insane and Leper. For Leprosy the figures are 285 males and 68 females or a total of 353 persons. This number cannot be taken as at all giving the amount of this disease in the colony, although there is no reason to accept the exaggerated estimates that have from time to time been made. I think that this disease must be slowly dying out in the face of the steady but slow improvement that is taking place in the colony in sanitary matters. Any maintenance of this disease amongst us is to be feared from our Indian Immigrants, who, in spite of all the care that is exercised in this matter both here and in India, from time to time bring this disease with them. Dr. HILLIS gave an estimate in 1881 of 1 leper to every 500 of the people, and a government return from Medical Officers in 1879, fixed the total leper population in the colony as 525, but this was not correct. Lepers are counted in the Indian Census and although they might not be all correctly returned here, there is no reason, as far as I can see, why this part of the schedule should be more inaccurate than any other.

The insane are divided into 418 males and 203 females. This number is probably nearly correct for there are few

nsane in the colony at large. The Registrar-General gives no comparison of these figures with the returns of 1881.

The number of deaf, dumb, deaf and dumb, and blind show an increase. See the figures:—

1881.	171	Deaf	52	Dumb.	44	Deaf and Dumb	185	Blind.
1891.	252	,,	43	,,	58	,, ,,	439	,,

Some of this increase may be due to natural growth, but more accurate returning must account for the increase in the larger figures. As far as I am aware there has been nothing in the colony to cause such a large increase as 254 in the number of the blind people in the last ten years.

Proportioned to the total number of inhabitants, these figures, as to the infirmities, give the following results. There are 1·2 lepers to every 1,000 inhabitants, or 1 leper to every 788·4 inhabitants, but this is probably not correct. There are 2·2 insane persons to every 1,000 inhabitants or 1 insane to every 448 persons. In 1881 there were 1·8 insane to every 1,000; but the rise in the figures must not be taken as indicating an absolute increase in the rate of production of insanity. The explanation of the higher figures is to be found in the fact that persons now send their sick to the Asylum more readily than formerly. Another factor in the rise in the number of the registered insane is the prolonged life of the Asylum patients. In England the insane a short time ago were given as being 2·71 per 1,000 persons. There is 1 deaf person to every 1237·6; 1 dumb to every 6626·8; 1 deaf and dumb to every 4882·9 and 1 blind to every 634 persons. The proportion of blind is high here, for in England there is only 1 blind to every 975 persons. Like all other figures in the householders schedules, one cannot feel sure of the accuracy of the returns, but taking them as

correct, I would suggest the extreme prevalence of cataract, even at an early age relatively, as the chief cause of so much blindness. In England there is 1 deaf and dumb to every 6,701 inhabitants. The number in receipt of out door poor relief from the schedules Mr. DALTON gives as 444, but I find 2,322 is the daily average number given by Mr. P. H. R. HILL in his Annual Report for 1890 as Poor Law Chairman. This latter number may be taken as being much, very much, nearer the truth than the Census Return.

The number of patients of hospitals and other institutions are not given as such in the Census Report. I give the daily average population for 1890, which conveys a fairly correct idea of the number, that probably were resident at the time of the Census :

The average daily number of patients in the Public Hospital Georgetown, 1890 662
The average daily number of patients in the Public Hospital, New Amsterdam ... ... 131'5
The average daily number of patients in the Public Hospital, Suddie 47
The average daily number of patients in the Public Hospital, Mazaruni 7
The number of patients in Lunatic Asylum, Census Return ... 621
" " " Leper " " ... 353
The average daily number of inmates Orphanage Georgetown, 1890 90·42
Number of inmates of Onderneeming Reformatory, Dec. 31, 1890 150
" " " Girls " " 31, 1890 20
Mazaruni Penal Settlement, daily average 1890 295
Georgetown Jail, " " 490
Fellowship Jail " " 12
New Amsterdam Jail " " 59
Suddie Jail " " 233
Prison No. 63 " " 1
Number of inmates of Georgetown Almshouse, daily average 1890 547
" " New Amsterdam " ... " " ... 150

This gives the following totals, Hospital patients for whole colony 847·5; Asylum patients 974; Almshouse inmates 697; Reformatory inmates 170; Orphans 90·42; Prisoners 1,116—being a grand total of 3,888 persons, or 1·3 per cent of the total population.

These are some of the points of interest that have presented themselves to me in my study of the report of the Census of 1891 of this colony. What I have said has been written with a deep sense of the truth of the cynical maxim, of not prophesying till you know. But the figures are there, and those who run may read.

Clubs and Societies in British Guiana to 1844.

By James Rodway, F.L.S.

BEFORE the arrival of the English in 1796, no clubs or societies appear to have been in existence in these colonies, or, if there were any, they must have held secret meetings. It may be presumed that something like political clubs had been formed before 1773, as in that year a Proclamation was issued in Demerara and Essequebo, authorising the Fiscal to prevent any meetings to discuss the action of the Government, to arrest the persons concerned and have them whipped. This was confirmed and re-published in 1785, and appears to have had the effect of stopping everything like open discussion in the "two rivers," and causing the political agitation to be carried on in the mother country for the next four years. This kind of thing had already happened in the case of Berbice in 1769, when a kind of Protection Society was formed in Amsterdam by representatives of the planters, which carried on a struggle with the Berbice Association against obnoxious taxes. This appears only to have been kept up as long as was necessary, that is until the States General gave their decision on the points in dispute. With the arrival of the English however, in 1796, something like a club was found necessary, and this appears to have originated at an inn or coffee house in Stabroek, which afterwards went by the name of the Union Coffee House. Both English and Dutch joined the "Union" or "Eendragt" Society, and we may presume that its name was derived from this fact. The exact date of the

formation of this society is doubtful, and it is quite certain that during the short rule of the Batavian Republic in 1802-3, it must have been suppressed, but on the re-capture we find it in a flourishing state. In July 1805 Mr. M. CAMPBELL advertised in the *Royal Gazette* that he had built a commodious house on the front of Pln. *Vlissengen,* and having obtained the Governor's permission, intended to continue the Union Coffee House under the same rules with which it began. He would have two good billiard tables, a room for subscribers, where they could meet on business, and a number of bed-rooms, while a Committee would be chosen from the then subscribers to regulate the admission of new members.

This building seems to have been situated at the south-east corner of America and Main Streets, and the present edifice on the same site will probably contain portions of the old structure. Besides its club rooms it contained a hall, which was used for concerts, amateur theatricals, public meetings and dinners, while the Amicable Society also met there, one of its monthly meetings being advertised to take place on October 2nd 1805, at eleven o'clock in the morning. The first subscription concert took place on the 10th of April 1805, at half-past six in the evening and was followed by a ball. Gentlemen non-subscribers were charged twelve dollars, and ladies one joe, each to be introduced by a subscriber and no coloured person admitted. The Eendragt Society held its half-yearly meeting here on the 7th of June 1806, when the "Governor and twenty-five subscribers sat down to an elegant dinner."

Mr. CAMPBELL offered the Coffee House for sale in

June 1806, describing it as that well-known and faithfully built house on lots 7 and 8, front of *Vlissengen*, with the establishment of the Union Coffee House, his servants being excepted. It was two stories high, raised on brick walls of nine feet, having two fronts each sixty feet long by twenty-six wide, forming an angle. Besides several large rooms, there were six bed-chambers furnished with bedsteads, beds and mosquito nettings. Then came a number of out-buildings, and sheds, stables and dwelling-house, all new and of the best materials. The lots paid a ground rent of a thousand guilders per annum, under a forty years' lease, and the annual income of the establishment amounted to 12,672 guilders.

Later we find the Coffee House in possession of a Mr. MARSH, when it was often called by his name instead of the "Union." In 1812 the large room was fitted up as a "Theatre Royal"—"George Barnwell" and the "Anatomist" being played in February. The performers were amateurs, and the price of admission was, upper boxes with refreshments one joe; lower boxes five dollars; pit three dollars; and back seats two dollars. About this time we find convivial societies under the name of Sons of St. George, St. Andrew and St. Patrick. In describing the festivities of the day sacred to the last, the *Gazette* said that "about eight o'clock, the Union Coffee House exhibited a very beautiful, and, from the shrubbery in front, a very picturesque spectacle of variegated light, while the arrangements within claimed still more admiration." The ball-room was lit by four superb chandeliers and a multitude of small crystal lamps, giving a wonderful effect to the dazzling splendour of the whole. Dancing commenced soon after nine, to the music of the band of

the "Royals." Above the Governor, at the supper table, was a large transparency of the Irish harp, with the motto *Quis separabit.*

At this time there was an opposition house going under the name of Marshall's Hotel (quite distinct from Marsh's). Here a meeting of proprietors, attorneys, and other representatives of sugar estates was held on the 30th of November 1811. The chair was taken by Mr. JOSEPH BEETE, and among those present were CHARLES WATERTON, CHARLES EDMONSTONE, PETER ROSE and N. M. MANGET. It was then stated that the produce of Essequebo and Demerara was estimated at £1,860,000 per annum, but on account of the war the loss amounted to £1,200,000. If the planters were allowed to send their sugar to the United States, and distillers permitted to use it, their position would be much alleviated; it was therefore agreed to petition Parliament for these concessions.

On the 4th of January 1816, a "Union Dinner" took place at the Union Coffee House to celebrate the battle of Waterloo. In September previous, T. MARSH had offered the establishment for sale, stating that it was worth the attention of Merchants and Planters, and fitted for a Commercial Hall or Offices. In April 1816, the Coffee House was put up in a lottery, the whole of the premises, furniture and effects being valued at 72,826 guilders, the buildings at fifty thousand and the remainder made up of the effects, including the negro man GEORGE, a billiard table, boat, horse, cow, &c. There were to be 302 tickets at ten joes each, and the lottery was to be drawn as customary under the superintendence of a Secretary's clerk. It was not disposed of, however, but MARSH advertised in June 1817, that he was making

it into "Commercial and Assembly Rooms" with billiard and coffee rooms, where the London and Colonial papers could always be seen; he also intended to establish a mess. All the efforts of the proprietor seemed however ineffectual, and the establishment was finally sold at the Vendue Office on the 26th of January 1819.

In January 1815 a "Committee of Commerce" was in existence, as may be gleaned from the fact that the Governor informed its Chairman that two American privateers were then off the coast. About the same time there existed also a Whist Club and a Cock Club, while in the following year, there were races on the Kitty Course in September, probably under the auspices of the "Sporting Club." On the 24th of August 1816, a meeting was held at Marshall's Hotel to form an "Association for promoting Manly Amusements in the United Colony." The meeting considered that horse racing improved the breed, boat racing trained good rowers, and that all other manly amusements promoted health, dissipated spleen, and abated scandal. It was agreed to form the Association and look out for a race-course, the annual subscription to be two joes. In November following it was stated that the "Sporting Club," had imported some race-horses, while the other Association informed its subscribers in January 1817, that a circular race-course had been leased in front of Pln. *Turkeyn*. In July 1817 it was proposed that the old and new sporting clubs be consolidated, but whether this was done or not the newspapers do not say. Berbice had its "Union Coffee House" at New Amsterdam and probably clubs similar to those of Demerara, but she seems to have been ahead of the sister colony in establishing an Agricultural Society,

which was in existence as early as 1812. The monthly meetings were held at the houses of the planters, and either begun, or more probably ended, in a dinner. At the meeting held on Pln. *Bohemia*, April 26th, 1812, it was decided to offer a premium for satisfactory instructions as to the manufacture of plantain fibre, to give five joes to Mr. ANDREW BLACK for the best model of a weaving loom, and to offer a similar premium for a machine suitable for spinning plantain fibre. The stewards of the "Berbice Agricultural Society" were Messrs. ROBERT TAITT, JOSEPH MCDONALD, JOHN ROSS and GILBERT ROBERTSON; it appears to have flourished for a time and then quietly dropped out of existence without notice.

The pioneer of this class of Society in Demerara was established in 1815. Mr. LACHLAN CUMING, the Chairman, invited those gentlemen who had proposed to establish an Agricultural Society to meet at Marshall's Hotel on the 25th of September, to form regulations and dine together. This notice appears to have roused the merchants, who did not like to be excluded, the result being that a month later we find the "United Society of Merchants and Planters" proposing to dine together on November 15th, to celebrate the establishment of their Society. This led to some correspondence in the *Chronicle* and *Gazette* between Mr. CLAYTON JENNYNS the Second Fiscal, and "Detector," the former recommending the new society to try and put down a number of abuses, while the latter was inclined to "pooh pooh" the whole affair. JENNYNS said that some jealousies and misunderstandings existed between the merchants and planters, it was therefore proposed by some friends of

harmony that a social meeting of both parties should be held to establish good-will and a better understanding under "the exhilarating influence of a good dinner and generous liquors," so as to secure for the future more cordiality between the two professions "so mutually necessary to each other's welfare and prosperity." One of the abuses to be reformed was the missionary system, which was stigmatised as undue interference between master and servant, and this induced the Revds. RICHARD ELLIOT and JOHN DAVIES, to join in the controversy, the whole correspondence being afterwards published in a pamphlet.

On the 25th of January 1816, the first Masonic Lodge was consecrated, a procession being formed at Brother MARSHALL'S Hotel at noon and proceeding to the building, where the customary formalities were performed, the Revds. G. STRAGHAN, the English clergyman and B. FLOORS, the Dutch Minister, being both present.

The establishment of Agricultural Societies in Berbice and Demerara was soon followed by one in Essequebo, which appears to have been founded in 1817, the Secretary and Treasurer being Mr. GEORGE BAGOT. The meetings were held on different plantations, being accompanied by the indispensable dinner. In March 1821 it was decided that two gold medals should be presented to the persons in charge of estates who reared the greatest number of children in proportion to the adult female slaves on their plantations in the year 1820.* A month later a hundred guineas or a piece of plate of that value, was offered for an essay upon the Plantain Disease

* One of these medals was presented to Mr. George Bagot, and is now in the possession of Mr. G. B. Steele.

and its remedy. This disease had lately appeared in Essequebo and on the west coast of Demerara, and in presence of the fact that plantains were the principal food of the slaves, it naturally caused great alarm. At the same time a gold medal, value five guineas, was offered for the best essay on the manufacture of sugar and rum. How long these Societies lasted is uncertain. The members were very enthusiastic at first, but their ardour soon cooled, and after two or three years, all interest was lost, or quarrels took place which led to dissolution. The meetings were often kept up until the small hours of the morning, by which time many of the members were lying down under or over the table, or ready to pick quarrels with each other or dispute and bet on matters of little importance. In December 1817, SAMUEL PHIPPEN publicly offered three debts of honour for sale at fifty per cent discount. They were due to him from H. M. BUNBURY and consisted of seventy-five joes on two bets and eight lost at the Whist Club. The advertiser stated that being about to leave for England and having applied many times without any result, his debtor telling him he might do what he liked, he took that method, although he did not expect it to produce cash payment.

The state of society in 1818, is well-described in the *Gazette* with a touch of satire, by "Reprobator" and "Primitive" (CHARLES WATERTON?). The former said the colony was credited with an hospitality that failed not, a readiness to subscribe at the calls of charity, utility, or compliment, a certain squareness in mercantile transactions, as well as literary attainments and public epistolary capabilities of which they had seen many most creditable specimens. On the other side, however,

although issuing certainly the two best newspapers in the West Indies, it must be observed that from the frequency of attacks, insinuations, sarcasms, tales of scandal and exposures to public ridicule, it was certain there were unhealthy sheep in the flock. "Primitive" said he lived near the foot of the Andes and had not been in Georgetown for twenty years. Recollecting what it was and seeing the change, he could not help exclaiming, what a contrast! Bushes had been changed to houses, cotton and coffee pieces into roads and avenues, there was a population without bounds, horses innumerable, and carriages beyond description. But what amused him most were the extremes of fashion. One had inexpressibles as tight as wax and thin as wafers, another's were of Kersey as impervious as a stone wall and shaped like coffee-bags; some "clodded" it most clownishly in boots, others most gracefully skipped it in pumps; some wore hats as big as umbrellas while others braved the sun in "snippets" that scarce covered their noses; finally some wore short jackets they could hardly move in while the huge coats of the dashers would envelope a cabbage tree. But above all came the spectacles—the rage for spectacles—in colours as diversified as the rainbow. What a change in the climate—no sooner landed than blind. Yes, every eye double and sometimes triple. "Unhappy creatures!" he said, when a friend told him not to waste his sympathy, as glasses were assumed for convenience if a *Dun* was coming, because bad sight was an excellent excuse; but on the contrary when they went dunning, because they could not have too many eyes. A correspondent the year before suggested that advertisers should be more careful in their

public notices, as such expressions, 'no notice of his repeated threats', 'will pay no debts after a certain period', 'will sell the obligation at public vendue,' would make people outside think them poor as church mice. "In the name of policy," he continued, "let us keep these things to ourselves."

The latter years of Governor MURRAY'S administration were not favourable to clubs and societies, the feeling of the time running in political channels. The continual interference of the British Government in the shape of Orders in Council for the amelioration of the slaves, the dispute with Sergeant ROUGH, President of the Court of Justice, and finally the slave insurrection, tended to produce virulent party feeling, and prevent union for any good object. In connection with ROUGH it may be mentioned that a sort of political club was kept up on Pln. *Belair,* which organised a procession through Georgetown on hearing that the Sergeant was dismissed. There was a transparency on a car reflecting on the President's behaviour, and an effigy, which would have been burnt before his house had not the Fiscal given orders to prevent this. The Governor is said to have been behind the scenes, and to have instigated the procession, which stopped before the houses of obnoxious parties, hissing, jeering and throwing stones, while at Government House and that of the new President, Mr. DEGROOT, they shouted loud hurrahs.

With the advent of Sir BENJAMIN D'URBAN, a different state of things was introduced. Both the Governor and his lady were very popular generally, and Camp House became the centre of a little scientific and literary circle, the like of which has not been known since. One of the

first introductions was a subscription Reading Room, of which we find advertisements in March 1824. Later on in the same year a meeting to form a Steam Navigation Company was held in the Colony House, while the Governor himself founded a Philosophical Society which held its meetings at his residence. Several papers read before this Society were published in English magazines and from them it appears that it concerned itself principally with physics. Subscription Book Societies were first introduced about this time, one of the printed labels of the "Demerara New Book Society," containing fourteen names, that of the Governor coming first. In December 1831, two thousand volumes belonging to this society were advertised for sale.

Other institutions of this time were the Demerara Literary Society, Georgetown Book Society, Medical Book Society, the Benevolent Society of Mechanics (a Friendly Society) and a branch of the Society for Promoting Christian Knowledge.

In 1832 the influence of Governor D'URBAN seems to have almost suppressed open political discussion, the newspapers being prevented from criticising the action of the Government. To make up for this, which was set down as arbitrary and tyrannical by a few, a better state of things began to dawn. Among the novelties of this time were artesian wells, which, as is well-known, supply a brackish chalybeate water. Mr. F. P. BRANDT, in 1832, took advantage of the qualities of the water to establish the Demerara Spa in Cumingsburg. Hot and cold baths, were provided, as well as a reading room with English and colonial papers and periodicals and conveniences for drinking the water, only subscribers or persons

intending to bathe being admitted. In the same year we find the "Georgetown Private Library" with a subscription of 66 guilders per annum, and "D. MITCHELL'S Circulating Library" at 44 guilders or 6 guilders per month, three volumes being allowed to town and six to country subscribers. A correspondent of the *Gazette*, "Biblos," gives a rather flowery description of the latter. He said, there were several excellent book societies in Demerara confined to a certain class of readers, but there never before had been one open to all ranks of the people. Mr. MITCHELL having been therefore the first to establish a Library on that footing, deserved well of the public and merited its support. The collection as far as it went, would be found exceedingly good, and if due encouragement were given, it might be hoped that in the course of a few years such an assemblage of literary works would be found as might enable all who wished to obtain a tolerable knowledge of English literature. But apart from that Mr. MITCHELL'S shop would be found a charming lounging place for the half-idle; here might be had portfolios of caricatures, pictures, annuals beautifully bound, fit presents for the fair, casts and models of statues, flutes, fiddles, music, colour boxes, in short the whole paraphernalia of a fashionable watering place library—and, if the ladies would only set the example, there was a nice little room aback well calculated for raffles. Among the musical novelties was a song "My own sweet love, he's far away" by RICHARD TAYLOR of this colony.

In stating that this was the first case of a bookseller having a library, "Biblos" was mistaken, as we find such an institution in Stabroek as early as 1799. From the adver-

tisements of vendues it appears that good private libraries were also very common in the early part of the century, the lists showing that a really good selection was made.

The Demerara and Essequebo Agricultural Society was started in 1833, at which time none of the older societies of that class were in existence in either county. This and a sister society in Berbice were established at the time when emancipation was a burning question, and it naturally followed that they became political centres in which organised resistance to Government measures were arranged. An account of these societies has been given already in a former volume of this journal:* it is therefore unnecessary to say much about them. The *Gazette* in January 1834, spoke of the political tendency of the societies and said they wanted a general association comprising representatives of every class, but nothing was done to effect that object until the following year.

In March 1834 it was agreed to institute an association for mutual assistance and general charitable purposes, which went under the name of the "Guiana Philanthropic Society." The Governor was Patron, and the English and Scotch clergymen visitors, but no information can be gleaned as to its particular objects. A curiosity of this year was a society called the Believers in the Revelation, and the Signs of the Original Alphabet, and the letters of Light and the Numbers of Wisdom, and the Keys of Knowledge in the Scriptures, founded by Mr. J. Y. PLAYTER, a religious enthusiast. The *Courier* stigmatises him as one of those designing men

* *Timehri*, First Series, Vol. v., "Agricultural Societies in British Guiana."

who set themselves up as teachers of new systems of religion, who were far more criminal than medical quacks. PLAYTER offered to publish by subscription, "The Horn Book of the new light in the Seventy Ancient Galileans, and the Elders and Office-Bearers of the Wisdom of the Holy Gospel." It was to contain the origin and meaning of signs, hieroglyphics, letters and numbers, and the analogies between ancient mythologies, Æsop's fables, and the bible. It does not appear that the book was ever written, much less published, but PLAYTER gave lectures explaining his doctrines, one of which is described in the *Courier* as a "farrago of incoherent absurdity." His society appears to have been very small and became dispersed at his death. He met with great opposition, his meetings being often interrupted by mobs of young men and boys.

In January 1835, a meeting was held to discuss the desirability of establishing a Public News Room and Exchange in Georgetown. The Agricultural Society having invited the mercantile body to unite with them, the merchants held this meeting, but on account of some difficulties could not come to a decision. On the 17th of February following, however, the matter was arranged (without the planters) and in December the "Public News Room" was in working order. The subscription was forty-four guilders per annum, every respectable person being eligible, while strangers could be introduced, and military and naval officers admitted free. Whether the Agricultural Society carried out its project for a second Reading Room does not appear.

After the apprenticeship system had come into operation the necessity for Friendly Societies became apparent,

and the Revd. J. H. DUKE established the "Trinity Parish Friendly Society" in Essequebo in 1836. At the first anniversary meeting, held in January the following year, it was stated that there were 919 members on the books. In his address to the meeting the Rural Dean said that under their present institutions as well as under slavery, the young and healthy were compelled to maintain the aged and infirm, because it was by their labour that the cultivator could afford, and had therefore been required by law to furnish, the same allowances to those who could do little or nothing, as to the young and vigorous. All these arrangements were doomed, and the question then arose, when the young labourer demanded higher wages, who was to maintain the old and infirm? The cultivator could not be compelled to maintain them as a burthen on the plantation, and possibly would be unable to do so if he wished. A code of poor laws would relieve the distress but this would take time to discuss and formulate, and meanwhile what would become of the cripple, the aged and infirm, and particularly the poor, old, childless, friendless, brotherless African. They who had children and relatives would have to fall back on them, and the friendless African on the benevolence of his late master. But what in cases where the child was deficient in piety, the relative cold in charity, the master wanting in compassion? What was to become of them? Alas! many might and probably would be, their sufferings and privations—sufferings the more aggravated because *hitherto want had been absolutely unknown.**

* This shows up one of the difficulties connected with emancipation and is worthy of consideration in judging of that great change in plantation economy.

The medical profession of the colony, in view of the changes connected with emancipation, established the Guiana Medical Association in 1838. Hitherto the planters had paid annual contributions to provide attendance for all their people, but now that things were on a different footing the medical men prepared a tariff of fees, which the negroes, who had hitherto paid nothing, thought very oppressive. Poor fellows, they thought to have all the privileges of freedom without its duties and responsibilities.

In February 1838 a "Prospectus for building Public Rooms in Georgetown" was issued. The Colonial Hospital, which then stood on the site of the present Museum Buildings and Assembly Room, was about to be removed, and it was proposed to ask the Government for a grant of the lot when vacated. A new building was to be erected, in which would be an Assembly Room, Mess Room, Concert Room, Medical and Commercial Hall, and Offices. The want of such rooms was, they said, generally acknowledged, as they had to put up with inconvenience, while it was not *creditable to the colony* that only private houses could be had for meetings. This project was however not carried out.

On account of the difficulties resulting from emancipation and the necessity for imported labour, the planters combined to form District Agricultural Societies, which appear to have been affiliated one to another. They held monthly meetings at different places and talked over their dismal prospects, condoling with each other on the impending ruin of the colony, and sometimes ostracising one of their number for enticing away the labourers of an adjoining estate. In the report of the West Bank and

River District Agricultural Society for July 1841, they complained very much of the want of labourers, the deficiency being fully a third. There had been heavy rains and the coffee crop was abundant, but there was not enough hands to gather it. A large number of immigrants had arrived lately but they regretted to say none had been located in the river, which they considered an injustice, as they paid the immigration tax as well as others. In reply to their complaints the Governor said the immigrants were at liberty to choose their locations, the only advice given them being that the sea coasts were the most healthy.

As may be supposed, with ruin staring them in the face the planters could only talk over their troubles, and make complaints of this, that, and the other thing, for all of which of course the Government was to blame. They tried their best to keep wages uniform, but there were always some independent ones who would not agree, or after consenting, could not see their crops spoilt for the sake of a few extra guilders. The Government could do nothing, as the feeling in England was so strong that even the slightest attempt at coercion by law would have been disallowed, so the Agricultural Societies tried in December 1841 to bring about a new order of things by agreeing to certain Rules and Regulations. These differed in the several districts as they were formulated by the Society of each division, but all agreed to abolish the old slave allowances, to reduce wages, and fine the occupiers of cottages on the estates who would not perform a daily task. They also agreed in winding up with the provision that if the labourers continued on the estates for forty-eight hours after six o'clock on the

morning of the 1st of January 1842, they were to be considered as having agreed to the Regulations.

This proceeding seems to have been carried out in a most blundering manner, without consulting the negroes, who only knew of the regulations when printed notices were put up, in some cases not until the 31st December. The labourers at once became alarmed and sent deputies to the Governor asking what sort of law this was—whether Queen's Law, Planter's Law, or Governor's Law? The Governor, was advised by the Attorney-General that the final clause of the Regulations could not be legally carried out, and told the negroes that they were not bound by the Regulations, and must use their own judgment in making bargains, but, as the price of sugar was lowered the planters did not feel able to pay such high wages. Some of the negroes said that if they had been consulted they would have agreed to the reduction of wages, and perhaps a few of the other rules, but now they objected to have these imposed by the mere will of their employers, the result being a general strike throughout both Demerara and Essequebo. At first the labourers wanted to have a public meeting at Beterverwagting, but on the advice of the Governor they gave this up. *Blankenburg* was reported to be in an alarming state, the Manager having tried to prevent the people working on their provision grounds, and two Justices of the Peace sent to the Governor for assistance, who simply asked the Magistrate to enquire into the matter, which ended quietly. Ultimately both planters and labourers gave way to some extent and after several weeks' inactivity work was resumed.

Nothing further is heard of the District Agricultural

Societies, this strike having given them a serious blow, and broken the slight bond which held them together. Like their immediate predecessors they were ruined by concerning themselves with the great labour question, which put in the background everything tending to improvement in Agriculture; this was the reason why the founders of the Royal Agricultural and Commercial Society were so particular in ruling that no political discussions should take place at any of their meetings. The *Royal Gazette* of October 14th 1845, in speaking of a ploughing match in Barbados and the want of something of the kind in Demerara said, "where are our Agricultural Associations to stimulate and encourage improved methods of cultivation? The mischief among the Planters of this Colony is their self-enforced isolation: for deep reasons perhaps, their want of concert and mutual confidence. Each man thinks and acts for himself; his neighbour's system is not his; and in a few years he lustily complains of being ruined. Just so. But whose fault is it? The Government? The Government here at least is not to be blamed. It would be well for our agriculturists if they trusted more to themselves and less to Governments and Courts of Policy."

This article calling upon Demerarians not to let Barbados be ahead of them, was probably the first hint which led to the foundation of the present Society. But other agencies were at work. In the Town Council on the 13th of November 1843, Mr. S. JACOBS moved that the Court of Policy be asked for a grant of a portion of the land on which the old hospital then stood, for building a Town Hall. He was authorised to state that a thousand pounds could be raised in Water Street for the

purpose of adding a Commercial Hall. In commenting upon this proposal, the *Gazette* said it was only surprising that such a project had not long before been effected. With a population of over 18,000, the city was without that kind of place of rendezvous for news and business which had been found advantageous in the pettiest commercial town of every other part of the world. The Town Council would be well supported in carrying out the project, which should embrace, besides the Town Hall, a public library of standard works of reference, and a Museum of Natural History.

However, the Government was not on very good terms with the Town Council at that time, and refused to grant the site, so the project fell to the ground as far as that body was concerned. But there were other men ready to carry out the proposed objects, one of them being WILLIAM HUNTER CAMPBELL, a young Scotch lawyer who had arrived in the colony in the latter part of 1841. To his exertions and those of Dr. BALFOUR, Professor GRAHAM had said, the Botanical Society of Edinburgh mainly owed its existence, and when leaving Edinburgh for Demerara, the Professor trusted he might find time to cultivate, in so luxuriant a field, his favourite science of botany. In Demerara young CAMPBELL found friends in the well-known Sir WILLIAM ARRINDELL, Dr. BONYUN, and a few others, and bringing with him an enthusiastic love for science, the idea of a comprehensive Society took his fancy, or perhaps originated with him alone. However this may have been, he became the moving spirit in initiating the scheme, which was to include an Agricultural society, a Commercial News Room, a Literary Society with a Library, and a Natural History

Society with a Museum. Judging rightly that any one of these could not stand alone in such a small colony, he probably thought each would help to assist the other, and that this has been the result the experience of nearly fifty years and the position of the Society to-day go to prove. The Agricultural Society would no doubt have fallen to the ground long ago had it not been for the Library and Reading Room, while the commercial section has been even less stable. Perhaps the only fault was its name, which is rather too long and not comprehensive enough, leaving out of account the fact that it is intended to be literary and scientific as well as agricultural and commercial.

Referring to the Prospects of the new Society, the *Gazette* of February 15th 1844, said the object of the proposers of the Association was mainly to bring persons together to promote enquiry on matters connected with our local industries. But beyond this it was suggested that a Library, a Museum, an Official and Commercial Room, a Gallery of Models, and many of the advantages of a private club should be attainable. The editor cordially concurred in these recommendations, because the Society promised to become the nucleus for disseminating a general public taste for intellectual and scientific pursuits. The Society had been set on foot by several influential gentlemen, and no doubt would flourish, not perhaps so much for the sake of its main objects as the allurement of its subsidiary enjoyments. But it was of little consequence from what motive the impulse to enlarged and scientific pursuits was given, so long as its steady acceleration was likely to result.

The Prospectus was sent to the then Governor, HENRY LIGHT, Esq., by the Hon. WILLIAM ARRINDELL, who

said the draft rules had been drawn up by Mr. W. H. CAMPBELL, without aid or assistance from any one, and recommended that the framer of the papers in question should be Secretary of the British Guiana Agricultural and Commercial Society. In reply the Governor said the rules appeared to him to be quite unobjectionable, and Mr. CAMPBELL was likely to prove highly useful in giving practical effect to them as corresponding Secretary. His Excellency had long been desirous of seeing a Museum, Reading Room, Library, and Hall for public amusements established in Georgetown, and recommended that an early meeting of influential persons should take place, when he would be happy to inscribe his name as one of the Association. The result was the meeting of the 18th of March 1844, at which it was resolved that the subscribers there present should constitute a Society, to be denominated the Agricultural and Commercial Society of British Guiana.

The Bats of British Guiana.

By the Editor.

OF the various groups of animals represented in British Guiana, the bats may be said to be the least known, though at all times of the year, and in all places, certain species of the order are observable. From their being crepuscular and nocturnal, and owing to their rapid flight, it is a matter of considerable difficulty to obtain specimens, the more especially in the interior of the country; and it is no doubt due to these causes, that, in spite of the obtrusiveness of this particular form of life, so little has been done to the systematic study of the group from a local point of view. In fact, it may be said that the greater number of specimens obtained are only accidental acquisitions, since it is but rarely that they are obtainable in town except whe they have flown into a house at night, and are then killed while flying from side to side of the rooms, or when they are shot or netted in convenient haunts to which they resort during the day.

As the result of his extended observations and researches into the natural history of British Guiana, SCHOMBURGK, in his "Reisen", records but two species of bats as having been certainly ascertained; and since then there has been no account of the group as locally manifested. In the following short paper in which I am able to increase the record by fourteen additional species, some more detailed description of this part of our fauna has been attempted, though the contribution to the subject must be regarded as but a preliminary to further researches.

Apart from the labour of collecting specimens of the group, a very considerable amount of difficulty is met with in the determination of the species, owing to the scanty and unsatisfactory literature at hand on the subject, a state of things that has been aggravated, so to speak, by the limited edition that was published of the only complete work which has appeared in recent years, namely DOBSON'S "Catalogue of the Chiroptera in the British Museum," a work that has been for some time out of print, though it is but about thirteen years ago that it was issued from the press. I would therefore acknowledge with special pleasure the kindness of Mr. OLDFIELD THOMAS, F.Z.S., the distinguished Assistant in charge of the Mammalia in the British Museum, in naming the greater number of species to be mentioned in the following pages.

To a very great number of our colonists, the term "bat" at once suggests some so-called vampire or blood-sucker, just as the mere mention of the word "snake" is enough to arouse against all the innocent members of the group all the antipathy rightly to be felt only against the poisonous species. In the towns and coast districts generally, several species of bats are obtainable, but these are chiefly frugivorous and insectivorous, few specimens of the blood-sucking bats being known as occurring therein; while in the interior of the country and along the great rivers and the more open creeks, these "colony doctors"—as they are often termed by the creole labourers—frequently make known their presence by attacks on man and his domestic animals, and sometimes, especially in certain districts noted for their prevalence, to a dangerous extent. To mules and oxen in the forest districts, they are a

terrible pest, and it was once my experience for several days to have under observation, in an exposed district, animals that had been rendered quite unsightly by sores and by continual bleeding due to bites from these blood-suckers, inflicted particularly on the neck, shoulders, back and flanks.

The damage done to fruit by various species of bats is by no means inconsiderable, particularly in that they attack the more delicate kinds; and this can hardly be wondered at when one remembers that the several species about the town and its neighbourhood must be represented by large numbers of individuals—enormous numbers in certain species, if one may judge by the masses that take refuge in the hollow trees, and under the eaves and in the turrets of the houses, churches and other buildings. The protection of fruit from these creatures is not easily dealt with, since it is not often practicable to net the trees or fruit. In the Botanic Gardens, it seems to have been found of most benefit to place about the fruit trees or near the fruit, the spiny leaves or parts of the 'pimpler' palms, the sharp and minute needles of which perforate the wings of the depredators and thus either disable them or frighten them away. (WARD, *Timehri*, Vol. iv., New Series, 1890, p. 311.)

Another method which has been mentioned to me, on apparently credible authority, as having been found to answer perfectly in keeping away all kinds of bats—not only fruit-eaters from fruit trees, but also the blood-suckers from houses and from stalls in which oxen or horses are kept—consists in hanging plentifully about the trees or in the stalls, clear glass bottles filled with clear water. Owing to the transparency of the vessels and their con-

tents, they are not perceived by the bats, and, owing to their weight, the blow is sufficient, when the animals strike against them, either to stun or to kill the creatures or eventually to frighten them away. The method has been tried, though not in my own experience, and has been found successful in lessening the attacks on fruit; and it is said to be perfectly efficacious against blood-suckers in enclosed places where domestic animals are housed.

There is yet another aspect of the case in which bats obtrude themselves most unpleasantly on public notice in our towns, and that is in the fouling of the rain water collected from the roofs and stored in tanks and vats for drinking purposes. The matter is of some importance, since this rain-water forms almost the entire drinking supply of the towns-folk, the dark and impure canal water laid on throughout the town from the Lamaha being seldom utilised for drinking, except in the dry season, and then only by the poorer classes. The eaves of a very considerable number of our buildings are infested with bats, markedly so with those of the smallest species, which from their small size are able to insinuate themselves for shelter into almost impossible-looking retreats, and sometimes even under the shingles and slates. The excrement from these creatures falling into the gutters on the upper eaves, or on the projecting roof of the lower part of the houses such as the galleries, and thence collected by the lower gutters during rain, provides a constant supply of foul matter for the pollution of our rain water; and this pollution can only be prevented satisfactorily by collecting water for drinking purposes only from the upper roof, and at the same time taking care

that the gutters are so placed as to project well out from the eaves—thus carrying off the water as it falls from the edge of the roof, without leaving any space under the edge in which bats might take refuge.

Detailed observations on the habits of individual species of bats are not, in many cases, easily made. Of those species that frequent the houses or trees about the town, some information on habits will be given under the description of the forms; but a few notes may be given here as to the association of various species in the same habitat, and of the relations of the sexes in the various colonies. Colonies of the common blunt-faced bat, *Artibeus planirostris,* a widely distributed species that may be described as the commonest of the fruit eaters about the town, may often be observed under the hoods of the windows and under the eaves of the gables of churches and other buildings, especially on the estates and less frequented districts. Generally they consist of groups of from six to fifty individuals, in which males and females are associated, usually more or less equally matched in number. In another very common town bat, *Molossus obscurus,* the ordinary small house bat, the colonies must consist of large numbers of individuals, to judge from the continuous flights that will pour into the openings under the eaves or into the ceiling of certain specially favoured houses; but I am unable from observation to confirm the alleged disproportion of the sexes, or whether the males and females invariably are separately grouped, as has been stated by some observers. In *Glossophaga soricina,* the common long-tongued bat, the colonies observed about deserted or uninhabited houses generally consist but of few individuals,

the males and females equally matched and associated together, frequently paired and the pairs at short distances apart.

In many of the large and hollow trees, no doubt many colonies of different species frequently take refuge together, but whether they will ever be found associated in the same group is doubtful. From a large and hollow Oronoque tree *(Erythrinus glauca)* in the long Avenue of the Botanic Gardens—a tree from which a very strong and unpleasant odour floated on the breeze, to be detected by any one passing along the Avenue,—we succeeded, by carefully fixing a large netting at one large opening, and stopping up the others so as to keep in the smoke from burning straw, in procuring 110 specimens, 45 males and 65 females, of three distinct species—in fact, representatives of three distinct genera and of two families. Of a species of *Phyllostoma,* there were 32 males and 51 females; of *Noctilio leporinus* 11 males and 11 females; and of an undetermined species of *Molossus,* 2 males and 3 females. A few of this number were quite young; others were nearly adult; while many of the females were pregnant, and, in all the cases examined, contained but one fœtus. In no pregnant bat at any time examined by me, has there ever been more than one young.

During the smoking operation, 8 bats flew away; and no doubt a considerable number took refuge in little fissures and holes inside the tree and there died. The cries of several were heard afterwards, but we neither got the specimens nor saw them come out. At the same tree three specimens had been knocked down the evening before as they issued from their refuge. On

the whole therefore one must conclude that the settlements together consisted of a very large number of individuals, in which the males of each species were by no means so sparsely represented as is generally considered to be the case among bats.

In this preliminary paper, I have to record the occurrence of 15 species, this being the result of individual observation, though it is certain that many others are yet to be obtained. They include the following :—

1. *Vampyrus spectrum.*
2. *Carollia brevicaudatus.*
3. *Macrophyllum neuwiedii.*
4. *Phyllostoma sp.*
5. *Glossophaga soricina.*
6. *Artibeus planirostris.*
7. „ *bilobatus.*
8. *Desmodus rufus (?).*
9. *Molossus sp.*
10. *Molossus obscurus.*
11. *Noctilio leporinus*
12. *Rhynchonycteris naso.*
13. *Atalapha noveboracensis.*
14. „ *ega.*
15. *Thyroptera tricolor.*

Of these, the eight first are members of the family *Phyllostomatidæ,* and are characterised by the peculiar "Nose-leaf" processes which are absent from the other species; the next four belong to the *Emballonuridæ,* distinguished by having tails either shorter, or much longer than, the membrane stretching between the hind limbs (interfemoral); while the last three are *Vespertilionidæ,* in which the tails are long,

reaching to the extremity of the interfemoral membrane. With the exception of the four species, *Vampyrus spectrum, Desmodus rufus (?), Rhynchonycteris naso* and *Thyroptera tricolor*, all the other forms have been obtained about, or in the immediate neighbourhood of Georgetown.

Vampyrus spectrum, the largest of the American bats, and in fact, the largest of all other bats except the great Fox-bats of the East Indies which reach to a stretch of wing of even more than five feet, will readily be known by its large body and the wide stretch of its wings which often reach to more than three feet. There is an old specimen in the British Guiana Museum—the exact locality of which is unfortunately not recorded—which is more than three feet in length, with a length of fore-arm (a character which appears to be a feature of considerable importance in the diagnoses of species) of nearly six inches. Within the last five years, three specimens were caught by chance in the Manager's house, into which they had flown at night, and were forwarded to me from Plantation *Melville*, on the Mahaica creek, and this is the only exact recorded locality in the colony for the species.

From a very large hollow tree, in the yard of this same estate, I once made the attempt with others, to capture sets of what, from their great size, could have been no other species of bat than this—though several smaller specimens, probably of some other species, were mixed up with them. Various apertures in the trunk were stopped up to force the inhabitants to make their exit by one special hole, at which dense smoke was made; but the effort was unavailing since all along the trunk and great branches, there seemed

to be continuous sets of holes by which they were able to make egress. Burning sulphur was then tried and various other means, with further stoppage of holes, but the great hollow trunk and its ramifications were too much for us and not a single specimen of the bats was procured. As I had to leave the scene the next morning, there was no further chance of trying more elaborate methods which must have resulted in success. It had been tantalising the evening before to witness a continuous stream of these great winged creatures pouring out of one central hole high up in the trunk, and darting and wheeling, fluttering and hovering, about the fruit trees around the house, and helping themselves, no doubt, to the ripest fruits on the small high branches, as they listed; but it was infinitely more tantalising to know that the same stream would issue undiminished next evening, after our departure.

Though these bats are to a great extent insectivorous, yet from their size they must devour a large quantity of the mangoes, star-apples, sapodillas and other soft fruits where they occur, since their stomachs, when full, contain a considerable amount of pulpy matter. And indeed their great canine teeth, as in our bats generally, seem especially adapted for piercing and tearing open the skin, rind and fleshy parts of fruits, the power for the tear being derived from the force of their flight after they have seized the fruit with their teeth.

Though the name of this species is popularly associated with the small blood-sucking bats, and though such habits have been ascribed to this bat even in modern works on Zoology, yet it is well-known, and known for a certainty, that the species is quite innocent of such fell intentions and

habits. Its technical name, *Vampyrus,* from this point of view, is therefore an absolute misnomer; and though, on the same grounds the term would have been fairly applicable to the small and true blood-sucking bats, yet at the same time, it would have been scarcely appropriate for these on the score of their small size and insignificant appearance.

Common on the outskirts of the town among the hollow trees which it seems chiefly to frequent, though not infrequently it is caught flying about in houses in the evening, is the short-tongued red bat, *Carollia brevicaudatus.* This small bat has a spread of wing of about 10–12 inches, and is of a bright rufous tint in old examples, though the younger ones are more or less reddish mouse colour. The muzzle is slightly produced, and furnished with a medium-sized nose-leaf which is narrow and drawn out at the top; the tongue is short and scarcely extensile, and is never provided with papillose fibrils, nor is the under lip markedly channelled, though it is edged with small wart-like processes. The median incisor teeth are enlarged, nearly pointed and more or less triangular in outline, their edges being separated; and the lateral incisors are very small. The tail is distinctly short, not reaching to the extremity of the interfemoral membrane, but projecting for a short distance above, perforating the membrane at about its middle.

Easily to be confounded with the foregoing form which it closely resembles, is the long-tongued reddish bat, *Glossophaga soricina,* which is also obtainable about the coast, but less commonly so than the foregoing, and is more usually taken in empty or deserted houses than in trees. It is somewhat smaller in size, being about 10–11 inches in

stretch of wings. The tongue however is very extensile, and can be pulled out to twice the length of the head in the fresh state, while the upper part of its extremity which is somewhat broadened out, is furnished with closely set fibrils, like a sort of brush, and the lower lip is deeply channelled, so as to make a sinus in which the tongue seems to work. The incisor teeth of this species are somewhat enlarged, the median being larger than the lateral pair and projecting markedly forwards, with a fine cutting edge, the edging of both teeth being close together. The other teeth are fine and sharp, much more so than in the foregoing species. It seems likely, from the fact that they are found plentifully about the outhouses on some of the settlements where mules and oxen are frequently sucked, that these bats supplement their ordinary insect diet, with the blood of the domestic animals—at any rate this is the form which is credited by the residents at these settlements with the causing of this damage to their stock. Owing to the form and length of its tongue, this bat was formerly described as being a peculiarly terrible blood-sucker, but this organ seems to be modified in this way to enable it the better to lick out the pulpy matter of the various fruits on which it may feed.

The next form, *Macrophyllum neuwiedii* is also a small bat. As its name implies, the nose-leaf is very large; and the ears are of corresponding size. The tail instead of perforating the middle of the upper surface of the interfemoral membrane and projecting from it as in the two foregoing species, is continued to the extremity of the membrane. The incisor teeth are enlarged; and, very possibly, this form also supplements its usual insect diet with occasional tastes of the blood of animals.

The two next forms to be described are referable to the genus *Artibeus*, characterised by having the head short and almost rounded, with a thick and blunt muzzle, and the interfemoral membrane concave behind, and of little extent, no tail being present. The larger species, *A. planirostris,* has a large and thick, fleshy nose-leaf, the sides of the process being rounded and not produced upwards into lobes. This very common bat has a spread of wings of about 16–20 inches in width and is distributed all over the coast area. On the estates and in the towns, they are to be seen in groups of various sizes, males and females intermingled and fairly proportionately matched, hanging under the eaves or under the edges of the gables of the houses. During the fruiting season, when the sapodillas, star-apples, mangoes, and such like fruits are ready to be gathered, numbers of these large bats are to be observed at sunset, flitting in and out among the leaves and branches, picking out and feeding on the ripest fruits to be found. They dart up and down repeatedly at the same fruit, remaining momentarily almost stationary while their teeth are applied, and with the force of their flight they cause either the tearing away of part of the soft pulp, or the whole fruit, according to its degree of ripeness. The long and sharp canine teeth afford splendid grasping organs; while the strength of the creature is able to tear away even large fruits from their stems. The species of this genus have a very peculiar facies owing to the roundness and bluntness of the snout; while the much thickened wart-like or tubercular processes on the lips render them still more strange looking. The females of this species, even in a very large series of individuals, often

exceed considerably the bulk of the males, body against body.

The second species, *A. bilobatus*, is smaller than the preceding, and is sharply distinguished by the edges of the basal part of the nose-leaf, or horse-shoe portion, being produced upwards into lobes. The nose-leaf is still thick and fleshy. This species is much less common than the foregoing, and is but rarely to be obtained in the town. Its habits seem to be identical with those of *A. planirostris*.

The blood-sucking bats, which I have provisionally referred to the species *Desmodus rufus*, offer a peculiarly difficult problem to deal with. All over the colony, from the forest districts of the coast, throughout the whole interior, depredations from these nocturnal pests are to be feared. Generally the toes, not infrequently the hands, and occasionally the face, of the sleepers are the points of attack, though, in the domestic animals, any and every part of the body seems liable to the operations of the little blood-letters. Many persons seem to be exempt from attack, and though, as in the case of CHARLES WATERTON, constantly exposing themselves in an unprotected manner, have yet remained unbitten; while, on the other hand, others are peculiarly liable, and, especially in the case of Indian children where precautions against the pests amount only to sitting up and watching with them, certain individuals are constant victims—the continuous bleeding being productive of so great weakness as occasionally to result in death.

As to the exact species that causes this damage in British Guiana, or whether there is more than one, nothing is certainly known. No record exists as to the

occurrence of the species *Desmodus rufus;* and though bats are very common about the settlements of the interior where persons are often sucked, I have never obtained the species while travelling, all forms caught about the houses of the Indian stations being referable to frugivorous and insectivorous species. *Glossophaga soricina* is a common bat in such localities, and, as already mentioned, is looked upon by the natives as responsible for the damage. Possibly this may be the case, though the ascription seems to me to be based on the fact that this is the species usually caught about, or observed in their houses at night or in the day time. If the attacks on the domestic animals and man be caused by the specialised form, *Desmodus rufus*, the creature must certainly take refuge among the trees and stumps during the day. When the species is taken, it will readily be known by its small size, reddish colour, and peculiarly developed teeth. The incisor teeth are reduced to two, and are enlarged, long and trenchant, being nearly of the same size as the canines, and forming special cutting implements.

There yet remains another species of the leaf-nosed bats to be described. This is entered on the list as a *Phyllostoma*, though its exact position has not yet been accurately determined. It is about 14–16 inches in spread of wings, mouse-coloured when young and almost a bright tawny red when adult. The tail perforates the upper surface of the interfemoral membrane and projects above, the free portion being short. The head is rather elongated, but thick; the nose-leaf well developed and fleshy, the edges of the horse-shoe being neatly outlined. The upper incisor teeth are four in number, the median

pair being large, broad and with a broad and slightly rounded cutting edge, the two teeth fitting closely together and presenting an unbroken cutting edge; while the lateral incisors are very small and short, and are placed directly between the median pair and the canines. The lower lip is slightly channelled and marked with warts on each side. The tongue is short and thick, not extensile and fibrillated as in *Glossophaga*.

This bat is apparently to be found plentifully among the trees on the outskirts of the town, and is the species to which reference has already been made as found living, males and females nearly equally matched, in colonies in the same trunk with two other species, one a *Molossus* and the other a *Noctilio*.

The four following species are Emballonurines—two of them being referable to the genus *Molossus*. The commonest of these is the small common house bat, *M. obscurus*. It will readily be recognised by its small size, with a spread of wings of 9–11 inches; its dull blackish or mouse-coloured fur; its long and prehensile tail, extending as much beyond as in the interfemoral membrane; and its large ears—the face being destitute of any rudiment even of a nose-leaf. If the living bat be held loosely, it will, invariably in my experience, while struggling to escape, grasp the fingers with its tail, so as to pull itself backwards. It is the commonest of the town bats, being seen at sundown darting by the scores from under the eaves and gutters of many of the dwelling houses, and large stores and wharf-sheds, just as at dawn they may be observed returning to their haunts. This is the species that is chiefly responsible for the pollution of the rain water collected from the roofs and

stored in the vats. Owing to its small body and its flatness, the bat is able to insinuate itself into quite small cracks or openings in the boards, which would appear to the uninitiated as quite too small for its passage. From this perfect shelter and security in the towns, these bats have become quite the predominant form, being altogether protected from the hawks and the carnivorous mammals that otherwise might have a chance of lessening their numbers under strictly natural conditions. They are very frequently to be met with astray, on the floor, inside the houses; and, if undamaged, they shuffle actively and quickly along the floor, the tail generally becoming of much use in assisting to propel them forwards, though occasionally it is carried turned up in the air.

The second species of *Molossus*, is a much larger form, the body being more than twice the size of *M. obscurus*, and the colour of its fur of a rich reddish-black. Its incisor teeth are grouped centrally, and its canines are large and powerful. Its tail is also long and prehensile, and would seem to be of great use to the animal. This is not a house bat; and its habits are unknown to me, beyond the fact that it lives in hollow trees, males and females apparently about equally matched. Two males and three females were taken from a hollow tree with 105 specimens of two other widely separated species.

One of these associated species, represented in the tree by 11 males and 11 females, was the *Noctilio leporinus* This is not a house bat, having been taken only from trees in the Botanic Gardens. Its fur is of a strikingly rich foxy red colour, the tint becoming deeper at the sides of the body under the patagium where small glands are situated, from which a strong and powerful

odour arises. In size it is much about the same as the preceding species, the wing expansion being, however, greater, and reaching to from 14–16 inches. The peculiar overlapping and infolding of the lips, more especially the upper lip, gives a strange aspect to the face, increased by the warty and erect small processes on the chin. The special character of its teeth, also, well marks the form, the median incisors being almost rodent-like, though small, and the lateral incisors quite minute and almost hidden.

The *Rhynchonycteris naso* is the small bat so commonly distributed throughout the colony, and to be found in groups resting in the day time on the stumps and trunks of trees, especially where they overhang the water, along the banks of the rivers and creeks. This is the smallest of our bats, and has a spread of wings of about 8–9 inches. It is of a brownish black and grey colour, very closely resembling the tint of the trunks on which it settles, and on which, when at rest, it is hardly to be distinguished from the knobs and wrinkles of the bark. When disturbed, these bats flit along with a quick and jerky flight, settling on other stumps in the vicinity. They are preyed upon by the common "chicken hawk," the Great-billed Buzzard *(Asturina magnirostris)*, so constantly met with in the same localities, and no doubt by others also; and the reason of their protective colouring and form, in adaptation to their surroundings, is thus clearly apparent. The muzzle of this species is curiously elongated; the teeth are remarkedly small and fine; and the tail perforates the interfemoral membrane, appearing on its upper surface.

Of the three Vespertilionid bats, the two species of

Atalapha are to be obtained about the town, while the third has, up to the present, been obtained only in the North-west District. The *Atalapha noveboracensis*, is a very widely distributed and common form. It is of a rich ruddy colour, with a spread of wings of about 12 inches, and will readily be known by the absence of the nose-leaf, and by the long tail terminating at the extremity of the interfemoral membrane, which latter has its upper surface covered with hair. The teeth in these forms are curiously placed; no median upper incisors are present, their place being taken by a hard pad; and the two lateral incisors are small and placed close against the canines; while the under incisors are six in all, and are closely arranged. There are no upper premolar teeth in this species.

In the other closely-related, but larger, species, *A. ega*, one upper premolar is present on each side; and the fore-arm reaches a length of about or more than 2¼ inches, as against 1¾ inches in *A. noveboracensis*. *A. ega* seems to be an uncommon form, one specimen only having been obtained in town from the top of the Bourda district.

The last species to be noticed here, *Thyroptera tricolor*, is one of the most specialised of all the group. It is a small bat, with a spread of wings of from about 8–9 inches, and is rendered remarkable by the presence of an adhesive circular pad on each of the limbs—at the base of the thumb and on the foot—by means of which it adheres, during rest, to the various objects on which it may settle. The specimen in the Museum collection was taken by Mr. H. I. PERKINS, from a plantain tree to which it adhered by means of its suckers. Although it has only been taken once here, the species is known from

Brazil, and is doubtless widely distributed in the colony.

Of this group of beings, as indeed, of all other branches of our Fauna, it is likely that the course of the next few years will witness marked advances in our knowledge, *pari passu* with the opening out and exploration of the great forest and savannahs of the Interior—advances that will not only add to the number of specific forms, but will furnish more definite and accurate information as to their distribution, habits and inter-relations.

*Guiana Gold.**

By T. S. Hargreaves, Secretary, Institute of Mines and Forests.

NO doubt many people are inclined to view the gold industry, which has advanced with such rapid strides during the last few years in this Colony, as something in the light of a novelty, but as a matter of fact it is no new thing.

We know that the adventurers who invaded Central and South America at the commencement of the 16th century devoted themselves more particularly to the conquest of Mexico and Peru, leaving unexplored the marshy plains and impassable forests of British Guiana, which at that time had not the reputation of containing gold—that unique subject of eternal controversy.

It was not until after the conquest of Peru and after Orellana—despite the orders of his chief—had made his adventurous voyage down the mighty Amazon; and even years after that when MARTINEZ, the buccaneer, poured his dying confession into the ears of a Priest at Havanna, that the wonderful story of the city ruled by a descendant of the last of the INCAS, MANOA DE'LDORADO, was spread abroad.

The stories of the inexhaustible treasures to be found in the interior of Guiana attracted shoals of adventurers who coasted its marshy shores and ascended its numerous rivers in the vain search for the mythical El Dorado.

That gold existed on the Orinoco was proved to the satisfaction of Sir WALTER RALEIGH who lost his life

* Read at the March Meeting of the Society.—ED.

in playing for the stake of the possession of the auriferous districts—reports of which were brought to him.

Mr. RODWAY says in his annals of Guiana :—"In 1742 a charter was granted to WILLIAM HACK to prospect for gold in Surinam. In 1740 THOMAS HILDEBRAND prospected for silver in the Blue Mountains near Groete Creek, and on the Cuyuni and Mazaruni." He at any rate was near the gold, if indeed he did not find it. There are still some old shafts on the left hand of the Essequebo below Wolgu which are still called the Goud-Mijs by the Dutch speaking bovianders.

Mr. RODWAY also records that in 1751 a miner called SIMON ABRAHAM came out to Berbice under an engagement to search for gold and silver up the Berbice river.

Three centuries had rolled by before RALEIGH was vindicated by the discovery of the enormously rich quartz reefs of the Caratal district in Venezuela. The discovery of gold in French Guiana followed—Dutch Guiana was found to be equally rich, and as early as 1855 gold had been got from the Cuyuni river in British Guiana. About the year 1863 the Warrili Company was formed to work quartz reefs on the Cuyuni. The British Government however, refused its protection; and fear of the Venezuelans prevented the continuance of these operations.

In 1875 Messrs. D'AMIL and ANSDELL were working on the Cuyuni and in 1877 Mr. SCOTT joined their Company, and there were also three expeditions prospecting for M. VITALO of Cayenne,—one of them under Mr. BREMOND, and JULES CAMAN in command of another.

One of the pioneers of the gold industry in this colony is Mr. LAWRENCE FORBES, who was practically the first to work the ground in a scientific manner.

After the discovery of gold on the Cuyuni, the higher Essequebo was prospected—then the Puruni—the Potaro—the Conowarook—the Demerara—the lower Essequebo—the Barama—and lastly the Barima.

It is not until 1884 that we have any official record of the gold produced in the colony,—and it is very likely that for every ounce registered there were two ounces not officially recorded.

In	1884	250	ounces	was registered.
„	1885	939	„	„ „
„	1886	6,518	„	„ „
„	1887	11,902	„	„ „
„	1888	14,570	„	„ „
„	1889	28,282	„	„ „
„	1890	62,615	„	„ „
„	1891	101,297	„	„ „

The yield in Dutch Guiana for 1883 was 23,849 ounces and it increased very gradually up to 1887 when it was 27,456 ounces, more than twice as much as British Guiana. From 1887 until 1889 there was a considerable falling off, but in 1890 the production rose again to 25,048 ounces, less than half the production of British Guiana for the same year.

The geographical distribution of gold in the three Guianas appears to be in a broad belt running about North-west and South-east from the Orinoco to the Brazilian frontier of French Guiana.

In French Guiana the Rivers Sinnamary, Mana, Appronage and Maroni have been worked and some of the placers as St. Elie and Dieu Merci have been celebrated for their immense richness.

In Dutch Guiana the Maroni with its tributaries the

Awa and Tapanhony with the Surinam, Saramaca and Copenaam have been worked—the district between the Awa and Tapanhony which was for some years in dispute having proved incredibly rich.

In British Guiana every river of importance has been found to be auriferous, with the exception of the Berbice and the Corentyne, the latter being one of the greatest of our rivers.*

That these rivers—lying as they do between the richest portions of the auriferous zone—should not be productive, is not to be believed, and one would not be surprised to hear of important discoveries on either.

With regard to the geological features of the gold diggings in the Guianas, we find that in French Guiana the deposits at present known are confined to the deepest beds of ravines and creeks. The geological character of the country is metamorphic. Silurian rocks abound, with trap and more recent eruptive formations. The system employed for extracting the gold from the auriferous earth by the natives consists in an extremely rude process of washing; no machinery is necessary, and plenty of timber abounds for constructing the sluices. The bed of auriferous earth rests mostly upon a stratum of clay and is of varying thickness, from 2 or 3 inches to 2 or 3 feet, the average thickness being 13 inches.

The over-burthen or superincumbent crust consists of

* It is to be noted that, although gold has not as yet been found in paying quantities on the Berbice, the district is certainly auriferous, small quantities of the precious metal having been obtained in the Upper Berbice, and notably at Eureka creek above the Umbrella rapids, where to my certain knowledge, a location was made by a prospector during the latter part of 1890, while I was travelling on the river.—ED.

clay covered with a layer of decomposed vegetable matter and is also of varying thickness. The average may be taken as 5 feet. This auriferous bed is composed of quartz fragments, and other mineral resting on the clay, with fine sand above—thus the gold owing to its high specific gravity is found in greater quantities in the deeper and coarser portions of the bed.

In British Guiana it will be noticed on consulting the geological map of the Colony that the auriferous areas at present being worked are without exception along the line of the vast dykes of greenstone which intersect the Country from North-west to South-east. In the Potaro and Canawarook districts we find the greenstone in contact with quartz-porphyry and felstone, while at Omai the bed rock appears to be granite. The same remark applies to the Cuyuni and Massaruni, except that on the higher Cuyuni there is a vast area of schist and gneiss.

The coarseness of the gold varies, but the largest nugget hitherto obtained was that found by Mr. FRASER LUCKIE in the Canawarook in May 1891, and which weighed forty-two pounds and a half. This is small in comparison with the "Welcome Stranger" nugget found at Donolley in Victoria which gave 2,268 ounces of gold.

There has been much speculation as to whether there are any deep leads in this colony, but at present all the workings have been shallow.

With regard to quartz-mining, great hopes are held that the end of the present year will see quartz crushing machinery at work on the upper Demerara river and perhaps on the Barima. Sample crushings which have been

made by the Gold Commissioner have promised yields of form 1½ ozs. to as much as 5 ozs. to the ton.

The effect of the gold industry on the population of the colony has already been very great socially and morally, and it is contemplated that it will, in time to come, work a still greater revolution.

The labourers of the colony have been able to earn wages such as they have never before earned, and at the end of their 3 or 4 months sojourn in the bush, have had possession of larger sums of money than they ever before conceived in their wildest dreams. The result of this has been that they have been able to purchase luxuries and secure comforts which before were unknown to them, and this is the first step to the appreciation by them of the value of honest labour.

The number of labourers engaged in the gold diggings has increased enormously within the last three years.

In	1889	there were	4997
„	1890	„ „	12,003
„	1891	„ „	17,625

while up to March 8th, 1892, there have been registered 4,669. It may safely be conjectured that there are nearly 6,000 men in the bush at one time, and this would give an annual cost in wages and food alone as something like $1,878,000. At this rate each man would make nearly 17 ozs. of gold in the year, while in Dutch Guiana the average made per man appears to have been in 1890 about 15 ozs. In 1891 British Guiana employed nearly four times as many men as Dutch Guiana and made more than four times as much gold.

One reason perhaps why the gold industry in British Guiana has out-distanced her neighbours is probably that

we have a larger amount of labour at command. It is true that the labourer of Cayenne is by his habits and training better adapted to bush life than are creoles, but the population of French Guiana is small and scattered.

Another reason and perhaps a more cogent one is that we are more favoured geographically. One has only to look at the map of the colony to discern the wonderful advantages accorded to Bartica by its geographical situation. Located at the point of the great peninsula formed by the Essequebo and the Massaruni, it not only commands access to these rivers but also to the Cuyuni and Puruni whose embouchures are not far distant.

Each one of these rivers is gold producing and may be expected to produce large quantities of gold for many years to come.

Our Birds of Prey.

By the Editor.

THOUGH the title strictly includes the vulturine and strigine birds, it is intended in this present paper to deal only with the falconine group. Until the publication of SCHOMBURGK'S "Reisen in Britisch Guiana," in which a list of 32 hawks, identified by Professor CABANIS was given, little or nothing was known of the different species of these birds; and since then but a slight extension of our knowledge in this direction has been made by SALVIN'S "Revised List of the Birds of British Guiana" (*Ibis* 1884, etc.), based chiefly on the results of the repeated collections made by Mr. HENRY WHITELEY, who, however, has never collected along the coast. The list given by SCHOMBURGK was extended to 35 species by SALVIN; while in the present communication, I have to record the occurrence of 43 species, thus adding 8 new forms, not mentioned in SALVIN'S revised list, to this group of our fauna.

It is curious that, in spite of the fact that a very considerable number of books dealing with many of the features of the Natural History of the colony have been published, so little attention has been given to this predominant form of bird life. True Dr. DALTON, in his History of British Guiana, has made somewhat more than brief popular reference to many of the species of our hawks, but his descriptions suffer from the drawbacks that they are neither sufficiently accurate nor diagnostic—so that in the generality of cases, it is out of the question to be certain of the exact species referred to.

In SHARPE'S "Catalogue of the Accipitrine or Diurnal Birds of Prey in the British Museum," detailed descriptions of all the species that occur in the colony will be found, but, in very many cases, the birds are not mentioned as having been taken in British Guiana; while the generic and specific diagnoses are couched in such language as only to be understood by the trained ornithologist, and not by the general reader of Natural History who may wish to obtain some idea of this group of birds. The present paper is intended to supply the place of a handbook in which popular but sufficiently detailed descriptions of our birds are given for the recognition of the species met with, together with notes on their distribution and their habits, where these have been observed. Here a wide field of research lies open to those residents in the country districts, who would observe and study the habits and characteristics of these birds, for there are very many species about which little or nothing is known.

Owing to the enormous abundance of food of all kinds, and to the immense uninhabited tracks of forest and savannah lands, furnishing splendid shelter and breeding haunts, in all parts of the colony, these birds have multiplied to a remarkable extent, the species being not only distributed all over the colony, but represented by hosts of individuals to be met with in all directions. It is along the coast districts generally, however, and more especially along the tidal parts of the larger creeks that these birds are seen in greatest profusion and variety—though there are a few larger species, such as the crowned eagle *(Spizætus)*, the crested eagle *(Morphnus)*, the harpy *(Thrasætus)* etc., that are met with only in the higher parts of the rivers, in the dense recesses of the forest or

on the open bushy savannah lands, in which latter places also, the little kestrels *(Tinnunculus)* are most commonly to be found.

With the exception of the sociable shell-eating kite *(Rostrhamus)* and the bultata or bush carrion crow *(Ibycter)*, which are met with in large flocks—the former at times occurring in scores on the same bush, or passing in continuous flights, by the hundreds, along the savannah creeks, at sundown, to their roosting places—the hawks are met with either singly, as in the generality of species, or in small groups of from 2–12, as in the common harriers *(Circus)*, the chimachimas *(Milvago)* and the swallow-tails *(Elanoides)*, the last being seldom, if ever, seen perching, but circling gracefully in wide sweeps on the wing, and generally high up in the air.

Many of these birds occur in the immediate vicinity of the town, being often seen about the cricket-ground, race-course, seawall, Botanic Gardens, rifle-range etc., and not infrequently flying overhead in the city (See "The native birds of Georgetown", *Timehri*, Vol. v., New Series, 1891, p. 69). Owing to their raids upon the young chickens in the poultry-yards, the commonest of these are known by the name of "chicken-hawk," but this term is applied to at least four species of four different genera. The hawks generally have no local common names; and though a few bear such names as "pigeon-hawk," "crab-hawk," "snake-hawk," "baridi-hawk," etc, these terms are, in most cases, merely made use of by a few individuals; and they are neither uniformly applied, nor generally known.

The food of the different species is of a most miscellaneous character, ranging from mammals, birds, reptiles

and fish, to crustaceans, molluscs, insects and worms; while the seeds and fruit and leaves of various plants form a considerable proportion in many species. It was as surprising to find the food contents of individual specimens of *Ictinia plumbea, Asturina magnirostris, Elanoides furcatus, Ibycter americanus, I. ater,* etc., to consist largely, sometimes almost entirely, of seeds, fruit and young leaves, as it was to discover nothing but masses of leaves in the body of some of the specimens of the red-headed vulture *(Cathartes aura).* Scarcity of carrion would be sufficient to explain the peculiarity in the case of the vulture, though even then one would have imagined that fresh flesh would have been more acceptable than leaves; but in the case of the hawks, it is evident that, with the abundance of food in the form of insects, reptiles etc., they must actually prefer this partial vegetable diet. In certain species, there seems to be a preference as a rule for certain special kinds of food. Thus the sociable kite *(Rostrhamus sociabilis)* feeds chiefly on the various species of apple-snails *(Ampullaria glauca,* and *A. amazonica* – see "The Mollusca of British Guiana," *Timehri,* Vol. iv, New Series, 1890, p. 37, where the latter species is referred doubtfully to *A. papyracea)* : the common black-faced chicken hawk or laughing falcon *(Herpetotheres cachinnans)* on snakes and lizards; the black-necked red buzzard *(Busarellus nigricollis)* on crabs, worms, etc., which it gets on the mud-flats; and so on. Other species again seem to be altogether omnivorous. For instance, the commonest chicken-hawk, the great-billed buzzard *(Asturina magnirostris)* feeds on small mammals such as rats, mice, opossums and bats; on other birds, which it tears to

pieces while still alive; on lizards and small snakes; on crabs, shrimps, worms, etc., which it gets on the mud-flats; on all sorts of insects, such as cicadas particularly, grasshoppers, locusts, the large bodied moths, etc.; and on fruits and seeds—and perhaps it is due to this very wide range of feeding that this hawk is now the commonest throughout the whole colony.

Practically nothing is known locally about the nidification of these birds. Owing to the enormous extent of wooded and uncleared lands—the cultivated districts being but a mere narrow fringe along the coast and up certain parts of the rivers—it is out of the question to seek for the nests of the generality of the species, and of those few that at times make their nests on the coast, it is seldom that one is able to get at the eggs, owing to the inaccessible places, such as the tops of tall dead palms and other trees selected by the birds, in the midst of dense spiny bushes or in the swamps. The result is that in the collections of eggs made in the colony by persons living on the estates and in the country districts generally, it is seldom that one finds the eggs of the the hawks included, and then only of about two or three species. Notes on the nidification of three or four species of these birds have been given by Mr. LLOYD PRYCE (See "Nests and eggs of some common Guiana Birds," *Timehri*, Vol. v., New series, 1891, p. 67), but owing to the doubtfulness of the identification of the species, a good deal of their value is lost.

In describing the various species, there might be some convenience in treating first of the more commonly occurring forms, or in grouping them according to their size and colour; but this would have

the drawback of separating those closely related from each other. They will therefore be considered chiefly in the order of their relationship, and in this way some idea will be formed of the extent and distribution of the main divisions. Of the 43 species, four belong to the group of the caracaras, seven to the falcons, seven to the kites, seven to the sparrow-hawks and harriers, and seventeen to the buzzards—the remaining one being the fishing hawk or osprey. Taking them in this relation, the species may be grouped as follows—

Ibycter americanus
„ ater
Milvago chimachima
Polyborus cheriway

Harpagus bidentatus
Hypotriorchis femoralis
Falco aurantius
Herpetotheres cachinnans
Ictinia plumbea
Hypotriorchis rufigularis
Tinnunculus isabellinus

Rostrhamus sociabilis
Elanoides furcatus
Leptodon cayennensis
Gampsonyx swainsoni
Rostrhamus leucopygus
Elanus leucurus
Leptodon uncinatus

Accipiter bicolor
Micrastur gilvicollis
„ mirandollei
Circus maculosus
Accipiter tinus
Micrastur semitorquatus
Geranospizias gracilis

Thrasaetus harpyia
Spizaetus ornatus
Asturina magnirostris
Morphnus guianensis
Spizaetus tyrannus
Asturina nitida

Buteogallus æquinoctialis *Busarellus nigricollis*
Heterospizias meridionalis *Urubitinga zonura*
Urubitinga anthracina *Leucopternis albicollis*
Leucopternis melanops *Buteola brachyura*
Buteo albicaudatus *Buteo abbreviatus*
„ *unicolor*

Pandion haliætus.

In the identification of these birds, special attention must be drawn to the fact that the colouring of the young specimens is, in many cases, quite different from that of the adult; and that several apparently distinct birds, as judged by mere colouring, can thus often be obtained from a series of the same species at different ages—the more especially if the sexes be not marked and their characters thus confused. The full size of the adult, which is variable according to the sex of the bird, is soon reached, but several moults, or special developments of colour, must often take place before the final dress is assumed. The changes of tint vary a great deal in the different species, and it may be from an early dark colour to a later whiter appearance, or the reverse; though usually brown or reddish tints prevail in the young birds, and later give place either to black or white or pale bluish-slate. The species of *Urubitinga*, *Buteo*, *Rostrhamus*, and *Leptodon* in particular, are noticeable in this respect; but other special cases will be mentioned under the description of each form. The characters of the beak and limbs will give an indication of the nature of the bird, though to one unfamiliar with the group, single birds present many difficulties in their identification which only a series of specimens of the species, at different ages, can remove. In most

cases certainty of identification can only be attained by having the birds in one's possession. On the wing, their essential characters cannot be ascertained, and the various shades of colour, unless the birds are seen at very close quarters, may be obscured or indeterminable, or may even be mistaken.

The caracaras, which will first be mentioned, may be recognised by many characters. The sides of the face are markedly bare of feathers, much more so than in other hawks, and the patches of bare skin are brightly coloured. The toes are all connected, by skin as though they were somewhat webbed. Their beaks are long and strong, distinctly hooked, but much less curved than in the generality of hawks. One of the most commonly met with is the so-called bush carrion crow or bultata, the white-billed caracara *(Ibycter americanus)*, which is to be found all over the forest region, often in large flocks, and generally on the tops of the highest trees, where they are constantly shrieking out their harsh discordant cries, *cara-cara-a, cla-cla-cla-a*, which become almost deafening when the birds are disturbed. The males are about 20 inches in length, the females, as in the generality of other hawks, being much larger. The prevailing colour is black with a greenish and greyish gloss, while the belly, the thighs and the small covering feathers under the tail, are white. The bare spaces round the eyes, the eyes themselves, and the bare patch on the throat, are rich red, while the beak is yellow and the feet are red.

Though these birds are very vulturine in appearance, and are very closely related to other forms that are vulturine in habits, they seem to feed almost exclusively on

fruit and seeds, and the food contents of the stomach consist usually of such vegetable matter—the seeds of the various species of bird-vine *(Loranthus)* being largely represented. Though they are frequently met with among the trees along the banks of the rivers, they do not seem ever to settle on the ground, as their congeners, the black caracara, so frequently do.

The black caracaras *(Ibycter ater)* are much smaller birds, being from 16-17 inches in length. With the exception of a white bar at the base of the tail, they are of a black colour with a greenish gloss. The nostrils are quite round; the bare sides of the face are of a bright orange red, and the legs yellow. They are very commonly met with on the bushy savannahs, and along the banks of the great rivers, especially on the sandy banks and ridges, where they alight to hunt for food. Ticks especially seem a favourite diet, and mixed up with these in their stomachs will generally be found varying quantities of hair from the bodies of the various wild animals from which they have picked the ticks. Seeds of different kinds, and more particularly the seeds of the bird-vine, furnish a considerable portion of their food. They are almost invariably met with in pairs.

More common than either of the above, especially in the partially cleared lands on the coast, and along the bushy tracts on such savannah creeks as the Abary, are the chimachimas or white-headed caracaras *(Milvago chimachima)*. These birds are about of the same size as the last species, or slightly smaller. The head, neck, and entire under parts, are of a pale creamy or yellow white in the adult, the upper parts being brown with ashy margins to the feathers, while the tail is white

with brown bars at the base, and marked towards the top with a broad brown band giving place to a yellowish-white extremity. The bases of the wing feathers are white, and these with the white base of the tail are very conspicuous when the birds are on the wing. The nostrils are neatly circular. The young birds are very different in appearance, being reddish brown, spotted or margined with yellowish-white above, and of a yellowish or ochreous tint, striped, spotted or barred with brown, on the under side. All gradations between the two extremes are met with.

These birds are sometimes seen in the pastures on the cattle, which they frequent for ticks and insects, or on the ground or bushes where they seek out insects and small reptiles. Often they occur in large flocks, though the individuals of such groups generally perch at some distance apart.

The fourth and most typical of the caracaras, *Polyborus cheriway*, will readily be distinguished from the three preceding forms by its oval, not round, nostrils. The head is large, and the beak large and thick, the red featherless tracts of the face being large and very conspicuous. The prevailing colour is a deep brown-black, the neck and shoulders being barred with whitish yellow-brown. The wings and tail are white at the base, closely barred with brown-black, becoming black at the extremities; the under sides are brownish-yellow, the breast being black, passing above and below into black bars. In the young birds, as described, the black tints are represented by brown, and the yellow by white.

These birds are not met with on the coast, being confined to the savannah and more open tracts of the

interior. In their habits they are the most vulturine of the group.

The true falcons will be recognised by their toothed upper beaks—the curve of the beak being broken by the projection of a distinct and sharp tooth, or by two of them, on each side. The cuckoo-falcon (*Harpagus bidentatus*) which, in spite of its toothed beak, has its affinities chiefly with the kites, will at once be recognised by its having two teeth on each side of the upper mandible, a character that will fix the identity of the form in spite of the great variation in plumage to which it is subject. The males are about a foot long, the females being larger. The upper surface in the young birds is of a brown tint (with reddish edgings to the feathers) passing into pale or dark slate-blue according to age; the tail brown with numerous white bars, passing into black, with two or three white bars; the under surface white with brown bars or spots, passing into a deep chestnut, or greyish, with white bands; while the throat is always white and marked with a dark central blotch.

This bird is commonly distributed in the colony, but is most frequently met with along the creeks and the open clearings in the forest along the course of the great rivers, more especially in elevated situations.

Much more common that the foregoing is the falcon-kite (*Ictinia plumbea*), known by the common names of "pigeon-hawk" and "snatch-hawk" in certain districts. This bird whose affinities are also chiefly with the kites, is much about the same size as the cuckoo-falcon, being about 14 inches in length. Its upper beak is generally marked with a distinct tooth on each side, though occasionally it is barely indicated; and the

wings are very long, strong and pointed, giving rapid flight to the species. In colour, it is of a deep slate-black above, passing into pale slate-blue or grey on the head, while the under side is of a bluish grey, paler on the throat. The tail is nearly black, marked with two conspicuous white bars, a third being hidden by the covering feathers underneath. In the young birds, the colour is more black all over the upper part of the body, edged and streaked with white, and the under parts more or less barred with the same colour. The eyes are of a deep, piercing, fiery red.

This common falcon-kite is met with all over the colony, and more especially along the creeks and the sheltered parts of the great rivers, where it will be seen perching singly—though its mate seems never to be far distant—on the high branches and chiefly on the projecting dead limbs, from which it is able to keep a better look out. About the open clearings and deserted cassava fields of the Indians, this hawk, like so many others, will very frequently be found, perched on the top of the dead trees, every now and then darting swiftly at the various insects on which it delights to feed. Beetles particularly seem to furnish its choicest morsels, for parts of these insects will almost invariably be found in them. The brighter coloured insects (like *Chlorida festiva*, which is so common among the cassava in the Indian clearings), which no doubt are more easily seen from a distance, seem to be those chiefly preyed on, and masses of their bright wing cases will at times be taken from the stomach of these birds. Grass-hoppers, locusts, cicadas, ants, bees and wasps, and the grubs from their nests, are not refused however, though

it would seem as if they are only taken when beetles are scarce. Small portions of seeds, and quite young leaves, are generally found mixed up with the other food contents, sometimes forming a very large proportion of the mass.

The next species, the slate-backed hobby *(Hypotriorchis femoralis)* is, in the male examples, much about the same size as the preceding, though the females are larger; the tail, however, is much longer in proportion, and the body is of necessity much smaller. It is altogether a more slightly built bird. It is of a dark slaty brown above, the long wings and tail being tipped and barred with white. A very conspicuous pale brownish yellow or white stripe passes from each eye, to meet behind the neck. The throat, fore breast and belly, are ochreous or reddish white, and the sides of the breast are black, this tint meeting across the body, the feathers being margined with narrow whitish fringes. In the young birds, brown is the prevailing tint, the feathers of the breast being blotched with brown centre stripes.

This falcon is somewhat common on the coast, being obtained about the estates and along the creeks. It is however, widely distributed over the colony. It is a bold and fierce bird, and, owing to its long wings and tail, is characterised by a rapid and even sailing flight.

The commonest of the falcons, however, is the little red-throated hobby or baridie-hawk *(Hypotriorchis rufigularis)*, which is so frequently met with perched on the tall dead limbs of the trees along the banks of our creeks and rivers, and in the open clearings in the forest. This small falcon varies from 9–12 inches in length according to the sex, and is one of the fiercest of its tribe;

and though its beak is small, it is strongly hooked and the tooth sharp and strong. It is of a black colour above, with slaty edgings to the feathers; the throat is of a reddish and yellowish-white, passing into reddish brown at the margins of the upper breast and neck, where it almost forms a half-collar; the breast and under coverts of the wings are black with narrow white edgings to the feathers; the belly and thighs rich chestnut, while the wings and tail are barred with white.

The food of this species is of a very mixed kind, consisting of small mammals, birds, reptiles and insects, and it will often be observed darting from its lofty perch at its prey and returning to the same point to devour what it has caught,—just as will so often be noted in the case of the falcon-kite, and the great-billed buzzard.

Very closely resembling the foregoing, but of very much larger size, is the true orange-breasted falcon, *Falco aurantius (=F. deiroleucus.)* This species reaches a length of about 12–13 inches in the male and of about 15–16 in the female. In colouring it is much like the preceding falcon, but the throat is of a pure white, sharply defined from the upper breast which is chestnut; the lower part of the breast is black with broad orange-brown spots and edgings to the feathers, and this same arrangement of tints is continued on to the under coverts of the wing. The length of the median toe, without the claw, is much greater than that of the tarsal bone of the leg—a contrast with the two preceding species in which the reverse is the case. In young specimens, the upper feathers are more or less margined with reddish or yellowish white, retained for some time on the eyebrows; the edgings of the under feathers are

of a more reddish yellow, and the bars on the wing become almost oval blotches.

This species is a big and thickly built bird compared with either of the two preceding forms, and, altogether apart from its coloration and essential characters, may be distinguished from them by its stoutness of body. This is the chief representative here of those noble birds of prey which during the Middle Ages were so famous in the pastime of falconry. It might indeed be termed the South American peregrine. This is the first record of this species from the colony.

Easily to be distinguished from any of the preceding species is the little kestrel *(Tinnunculus isabellinus.)* This bird is about from 9–10 inches in length and of a very variable colour according to size and sex. In the adult male it is of a reddish brown tint above, more or less barred with black, the head and the coverts of the wings being blue, the latter marked with black. The tail is tipped with white, succeeded by a broad bar of black, the outer feathers more or less marked with black and white. The quills of the wings are black, barred with white, passing to slaty grey barred with black. The throat is white, passing into light brown or yellowish-white on the breast, flanks and sides, where there are a few dark spots. In the females and young males the upper surface is of a much richer reddish colour, and the tail is more uniformly barred with black.

This kestrel seems not to occur on the coast, being apparently confined to the open savannahs and higher lands, where it is generally met with, like its English congener the wind-hover, poised on the wing, hovering, while seeking for the small mammals, reptiles, insects,

etc., on which it chiefly feeds. Though a fierce and rapacious creature, this little hawk is slenderly and slightly built, being the most delicate looking of all our species.

Very different from all the preceding is the white-breasted or black-faced chicken-hawk, the laughing falcon, *Herpetotheres cachinnans*, so commonly met with on the coast and on the outskirts of the town. This is a heavily built and strong bird of about 18 inches in length, with strong and thick bill and feet. It is of a yellowish brown colour above and a yellowish-white below, the head and a collar round the neck being of this latter tint, though the feathers of the head, which form an erectile crest, are more or less streaked with brown on the shaft. A peculiarly fierce aspect is given to this bird by the presence of a broad black patch around the eyes, passing across the cheek and around the back of the head. The wings and tail are narrowly barred with brown and yellowish white, the quills of the wings having a conspicuous patch owing to their yellowish-white bases. This bird differs markedly from all the true falcons, in the absence of any tooth from the upper mandible, this portion of the bill being simply sharply festooned, and the tip suddenly hooked. The tarsus is feathered much as in the kites, though the greater portion is bare, but the wings are short and quite unlike the long and pointed wings found in the kites and their allies.

This hawk, as its name indicates, is particularly fond of reptiles for food,—lizards and snakes, the latter especially, being its main diet, though chickens from the poultry yard have not infrequently been known to be carried off,—hence its common name of chicken-hawk.

It will often be seen perching on the low bush, tall palms and other trees, in the fields, swamps and other places, though just as frequently on short stumps and sticks, close to the ground, or on the ground itself. Very often it will be noticed, hovering like a wind-hover, close to the ground, over the grassy and bushy areas in search of the small grass snakes and lizards. The little so-called horsewhip or three-lined grass snake, *Dromicus lineatus*, seems to be its most frequent victim. Its cry is loud, hoarse and shrill, and at times is very frequently repeated and can be heard from a great distance.

The following seven species belong to the group of the kites, which are recognisable by their long and much curved festooned bills, their long and narrow pointed wings, and their generally forked tails. The commonest of these is the sociable shell-eating kite *(Rostrhamus sociabilis)*, known to the old huntsmen in the Abary district by the common name of "cricketty hawk," the term "cricketty" being applied to all the apple-snails *(Ampullaria)* found along the creeks or in the savannah swamps. The beak of this genus of hawks is quite distinctive, the upper mandible being very long thin and curved, and altogether most admirably adapted to their work of picking out from the curved whorls of the shells of the apple-snails, the soft bodies of the molluscs. Their feet are also very slender for the size of the bird, and their claws are very thin, long, curved and sharp.

There are two species described of the genus *Rostrhamus* which are separated from each other by very slight and apparently insufficient characters. In the one, *R. sociabilis*, the characters, summarized from SHARPE'S

Catalogue, are:—length of body 13½ inches; colour bluish slate, inclining to leaden grey; upper and under tail coverts grey: while in the other, *R. leucopygus*, the characters are:—total length 18 inches; colour slaty black, with a brownish shade; upper and under tail coverts white. Now it must be mentioned that these measurements are based on specimens, the sex of which is not stated in the catalogue; while the difference in the size of the male and female specimens in this genus is often quite as wide apart as the measurements given above for the two apparent species; and at the same time, the shades of colour, bluish slate, and slaty-black, are but terms applicable at different states to the same bird in its passage from the yellowish-brown plumage of the young to the black of the adult. The character of the grey or white tail coverts is also one of doubtful value, since these parts vary as much as from white to grey, and from these to creamy white, in birds of the same size, though of different ages and of different colours over the other parts of the body. In both species, the tail is grey or greyish black, with a white or creamy-white base, and a white tip, succeeded by a broad sub-terminal bar of black. There are specimens in our Museum collection, identified at the Zoological Society as *R. sociabilis*, in which the length of the bird exceeds 16 inches; and while in a large set of forms there are to be found smaller specimens that seem to fit in with the description of *R. sociabilis*, and larger that seem referable to *R. leucopygus*, yet there are considerable differences in the shades of their plumage, and of the special character of the tail coverts, and the size of bird, that make one suspect that the two species, generally

considered distinct, are but varying sizes and stages of one and the same species.

In the young specimens of these birds, the colour is of a dark brown above, varied with yellowish edges to the feathers—the head and neck and under surface being yellowish ochre, streaked, spotted or barred with black. The base of the tail and the tail coverts at all ages vary from white to creamy white and grey.

As already mentioned, these birds are chiefly restricted to a molluscan diet; and at times, at the edges of the creeks, swamps and savannah pools, piles of empty shells left by these hawks may be found at the foot of some low bush or stump on which the birds had perched while feeding. Along the savannah creeks, and especially along the Abary districts, these birds are extremely plentiful; and at sundown they will be found perched in masses at special roosting places on the low bushes by the creek side, or they will be seen passing overhead, seeking shelter for the night, in continuous flights of some hundreds at a time, made up of young and adult birds of both sexes. While settling down to roost by the creek side, they will be noticed darting down and skimming for short distances almost on the surface of the water, as though catching insects, or splashing themselves, breast, wings and tail, with the water itself, while uttering low and peculiar shriek-like cries. If at such times they are disturbed, they wheel backwards and forwards in the dull light, close over the surface of the water, eventually to settle down on the same perches or on closely adjacent trees. As a rule they are extremely fat and fleshy, and by many of the negroes are esteemed as

food—attempts being made, in my experience, by individual boatmen to obtain them, even when there was an abundance of other fresh meat available.

Another very common species is the swallow-tailed or scissor-tailed hawk or kite *(Elanoides furcatus)*. These birds are more commonly met with in the forest districts generally, especially on the more elevated parts, than on the coast. Along the main creeks and rivers, especially on the great reefs and ridges, they are almost always to be seen, either singly or in groups of as many as 12 or more, circling round and round with most exquisitely graceful motion, swooping down suddenly, and then again rising upwards in wide sweeps, with arched wings and tail. The species will readily be recognised. It is about 20 or more inches in length, with long pointed narrow wings and elongated forked tail; of a pure gleaming white on the head, neck, shoulders, rump and entire under parts, the other parts being of a bright glossy green-black.

It is a well-known characteristic of these birds, that, if one of a flight be shot, the others will circle round and round the place where it has fallen, uttering their plaintive but shrill shrieks,—at times almost swooping down upon the body as though to remove it, when it is an easy matter to procure series of specimens, and possibly the whole flight. The species has a very wide range extending to the Central States of North America and to the southern parts of Brazil; while accidental, and apparently tempest-tossed, specimens have been met with in Europe.

The food of these birds, here, seems to consist almost entirely of insects and seeds. The winged females of

the umbrella or cushie ants, the large bodied moths, cicadas, grasshoppers, locusts, and the grubs of various species of *Hymenoptera*, evidently taken from the ravaged nests, make up, with seeds of the various bird-vines *(Loranthus)* and other plants, the food contents found at various times in these hawks.

Much less common than the preceding, and much more difficult to obtain on account of its rapid flight, is the grey kite *(Elanus leucurus)*. This species attains a length of from 14–15 inches, being of a prevailing pale blue-grey above, the feathers margined with white, paler on the head and darker on the wings, on the front of which there is a pronounced wide black patch above, and a smaller black patch below. The tail is white, except the two central feathers which are grey. The front of the head, and the entire under parts of the body, are white, though when the birds are young, these parts are more or less touched with reddish-brown. The upper surfaces too in these younger birds are mixed with brown. The legs are small and rather slender, but the talons are long, strongly curved and very sharp; while the curved point of the bill is very sharp and fine. This bird is not very often seen, apparently frequenting the tops of the trees in the forest and in the hilly districts, and becoming very shy of one's approach. From the length and strength of its pointed wings and tail, it cleaves the air with more rapid flight than is noticed in any other of our hawks, and on this account and owing to its fierceness, it is said here by the old huntsmen, to be more dreaded by other birds, especially by the pigeons, than any other. From this it is known by the common name of "hawk bass" (i.e. master);

and it is noticeable that other species all seem to be in a state of alarm during the passing flight of this bird.

The two next species to be described present the greatest range of variation in colouring to be found in any of our hawks. These are the two species of tooth-billed kites, *Leptodon uncinatus* and *L. cayennensis*, which range from a length of 17–24 inches, and seem to present, at different stages and ages, all varieties of combination of black, white, blue, grey, chestnut, brown and yellowish white. They will easily be recognised by the characters of their feet and beaks. The tarsal bones are short and feathered nearly to the base, and the scales behind are reticulated, while the toes are rather short, and furnished with long and thin, sharp claws: the beaks are strong and thick, and strongly hooked, the nostrils being covered with a large scale which gives a linear appearance to the aperture, while the loral space around is bare of feathers. In *L. uncinatus* the hook of the beak is very powerful and produced, recalling the shape of that of *Rostrhamus*, though the base of the beak is strong and thick, and quite unlike the thin base in that genus. In *L. cayennensis* the hook is much less pronounced, but at the curve there is a slightly projecting piece which forms a small but broad tooth. These birds differ from the typical kites in that their tails are not forked, the outer feathers being shorter than the median.

With regard to the colouring to be met with, the combinations vary almost with individual birds; and beyond the change from the young and immature to the adult stage, it appears that, as in the case of their representatives in Europe, the honey-kites, there are seasonal

changes which render it almost impossible to declare what tints one might meet with at different ages. The changes may take place either completely all over the bird, or only partially.

In *L. uncinatus* the length of body is about 17 inches and the young birds are brown, with reddish or yellowish edges to many of the feathers, the wings and tail being barred with the same tints. The head is of a deep brown, while a collar round the neck, and the under surfaces, are white, more or less spotted or barred with brown, or reddish brown. Gradually these tints give place to darker or paler shades. The brown becomes nearly black and then grey or slaty or dark blue, the head and neck especially; the collar round the neck becomes pure white, changing to grey and dark reddish and yellowish brown, and then altogether disappears; the bars on the wings become less numerous and less conspicuous above—those on the tail being replaced by two broad pairs, black and slaty-grey alternating; while the under surface changes from white to yellowish, and then to reddish or chestnut, blotched or barred with one or more of the same tints on a lighter ground, and then eventually to an irregular barring of blue and grey or white.

In *L. cayennensis*, the size of which is much greater than in the preceding—the females especially—the changes are less extreme, so far as the under surface is concerned, where the ground tint is always white, either pure or creamy, or blotched and streaked with brown; but on the upper surface, the changes are even more striking, for the brown tint of the young becomes more and more broadly edged with whitish brown and reddish

yellow, especially on the head, until the whole head and neck are completely white, or the crown and the eye-brows may be dull black on the white ground; while the barring of the wings and tail becomes less numerous but more definite. The black and white tints of the head then give place to pale slaty blue; while the rest of the upper surface becomes dull slaty black.

Both of these birds seem to be of dull, sluggish habit. They do not occur commonly on the coast, being more frequently taken in the low bush and along the edges of the forest creeks, where they seem to delight in seclusion.

The last of this group to be mentioned is the little yellow-faced kite *(Gampsonyx swainsoni)*. This little bird is only from about 8–10 inches in length, and, at first sight, from its size, might be mistaken for the little kestrel, from which however it is altogether different. The bill is simply festooned, not toothed as in the kestrel; and the body is much stouter in proportion, with shorter wings and tail—the latter being rounded as in the three preceding species. The upper surface is greyish-black, the wings and tail darker above, but very pale underneath and almost white, like the rest of the under surface, with the exception of a black patch on the sides of the breast, and the ruddy legs and sides. The front of the head and cheeks are bright-yellow; and a collar round the neck is white, followed by red shoulders.

This little kite is not a coast species. It is to be found in the higher lands of the interior where it frequents the forest, chiefly on the margins of the open savannahs.

Turning now to the group of hawks with long legs—those, namely, in which the tarsal bone is bare and quite

as long as the upper bone (the tibia) which is feathered in all birds—we meet with seven species referable to the true sparrow-hawks, the harrier-hawks, and the harriers.

Of the true sparrow-hawks there are two species, which will be recognised by the characters of their bills and feet. The bills are small and weak, and are marked by what may be called a double festoon, *i.e.*, that instead of there being one more or less continuous curve from the angle of the jaw to the tip of the beak, this is broken by a projection just under the nostril, so that two small curves are made, like the arch of the wings of a bird in flight. The feet are thin and weak, and the toes are particularly thin—the median toe being longer than the outer by quite a joint (the claw not included), with their claws very small and thin, contrasted with the large and long claws on the short inner and hinder toes. The back of the bare leg is covered with a row of large plated scales, not with small scales forming a reticulated surface.

In one species, the red-legged sparrow-hawk *(Accipiter bicolor)*, which varies from a length of 14–17 inches according to sex, the upper surface may be blackish-brown with reddish margins, or deep slaty-blue, according to age, the head being nearly black, the tail less so, and the wings browner. The under surface may be light reddish-brown, or pale slate colour, according to age; while the thighs are of a clear chestnut red. Against the clear slate of the breast and throat, the dark shafts of the feathers show out much like fine bristles lying over the feathers, presenting a very characteristic appearance.

These birds do not seem to occur commonly on the coast, specimens having hitherto been obtained chiefly along the uninhabited parts of the great rivers, and more

especially on the more elevated parts of the country. They are by no means shy—perhaps from the height and position of their perches where they are generally secure from molestation. They are very active on the wing, and exercise a kind of terrorising influence over the smaller and even many larger birds.

In the second species, the little barred sparrow-hawk *(Accipiter tinus)*, which attains a length of from 9–11 inches, the colour of the upper surface is of a more reddish brown than in the preceding when young, while the adult is greyer. The under surface is of a prevailing yellowish brown or white, barred with reddish or greyish brown according to age, the bars being very fine in old examples. On the paler unbarred throat, the dark shafts of the feathers stand out almost as in the preceding form. This species also does not seem to occur commonly on the coast, preferring the higher and less frequented parts of the interior. This is the first record of the species from the colony.

The next species to be described is the blue sparrow-hawk *(Geranospizias gracilis)*, of about 16–20 inches in length according to sex, and distinguishable not only by its colour, but by many other characters. The legs are very long, and seem much longer in comparison with other forms, owing to the feathers on the upper part (tibia) being very short and close, so that the limbs stand out from the body. The toes are short, the outer toe particularly, and this latter is furnished with a markedly short and small claw. The colour of the species above and below is a rich slaty-blue, paler in the young specimens, in which the under surface is banded with white disappearing with age, except on the thighs

and covering under tail feathers. The main quills of the wings are black, with a large white blotch on each; while the black tail is white at the base, white-tipped, and crossed with two narrow bars of white.

This bird is not commonly found on the coast, but occurs along the wooded creeks, where it will be met with perching on the sheltered branches in the more open places.

Three species of harrier-hawks are to be obtained in the colony. These birds are very much like the true sparrow-hawks, but are distinguishable by their much stronger habit. Their beaks are stronger and larger, their bodies more thickly built, their legs thicker, and their toes much thicker and shorter in proportion to their size. More than this, the back of the tarsus is covered with small reticulated scales, while the face is furnished with an indistinct owl-like ruff or disc made up of the small feathers of the hind-cheek and ear-coverts which stand out against the other parts.

The commonest of these is the black-barred harrier-hawk *(Micrastur gilvicollis)*, which is from about 13–15 inches long according to the sex. Above it is of a pale slaty-brown, the tail tipped with white and barred with two, three, or four, distinct narrowish white bands, according to the age of the bird. On the under side, the colour is greyish white or creamy, pure on the throat, but barred with regular bands of black over the other parts, though scarcely or not at all represented on the hinder and middle part of the abdomen. In colouring, this species very closely resembles *Accipiter tinus*, and would easily be confounded with it but for its size and essential characters.

This is a very widely distributed species, being commonly found on the coast, and in the immediate neighbourhood of the town, as well as in the interior parts of the colony, along the sheltered creeks and by the open savannahs. It is one of the species that commonly goes by the name of chicken-hawk.

The next species, the white-breasted harrier-hawk *(Micrastur mirandollei)*, but for its stronger build, and the absence of the red feathers from the legs, might easily be mistaken for the red-legged sparrow-hawk, which in general colouring it much resembles. The generic characters, however, are very distinct, as already described. This bird is of about 17 inches in length in the female—of which a single specimen alone is in our collection. The bill is strong and thick, and the feet and toes in proportion. The upper surface is of a pale slaty tint, the head and tail darker, the latter tipped with white and obscurely banded with three or four bars of ashy brown and white, entirely white and very conspicuous on the inner web of the outer feathers. The under surface is white, with obscure grey bands on the sides of the fore-breast and neck, and with black bases to the shafts of the feathers on the neck and breast.

The single female specimen of this form in the Museum collection was procured on the upper Essequebo river in March 1889. The species does not appear to occur on the coast. The plumage has a peculiar glossy and silky sheen which renders it very delicate and striking in appearance. This is the first record of the bird from the colony.

The third species, the long-tailed or collared harrier-hawk *(Micrastur semitorquatus)* differs much in appear-

anoe according to the stages of its growth. A striking feature in this form is the extreme length of the tail (nearly 11 inches), this being more than half the entire length (20 inches) of the bird, and the outer feathers are very much shorter than the inner, giving a very rounded appearance when the feathers are spread. In the young birds, the upper surface is of a pale ruddy brown colour, uniform and darker on the head, but tipped, multi-barred, and with pale reddish and brownish yellow on the back and wings, the bars becoming almost white on the tail and limited to about six. The under surface is of a pale ruddy or brownish ochre, strongly barred with black, while the ochreous colour forms a collar round the hind neck. In the adult birds the colour of the upper surface darkens, and the bars disappear, the quills of the wings and tail alone shewing bars of white; the under surface loses its dark bars, and, with the collar, takes on a pale yellowish brown which changes gradually to a creamy white.

These birds frequent the wooded districts, and are to be obtained in the open parts along the creeks and great rivers. They are not commonly met with on the coast. Their wings seem to be particularly short for the size of the bird, but this is rendered so disproportionate owing to the peculiar length of the tail.

The last of the long-legged birds to be noticed is the spotted harrier *(Circus maculosus)*, which, measuring about 20 inches in length, cannot, with its long legs, long wings, long tail, and distinctly marked facial disk or ruff, be mistaken for any other bird. The facial disk in this form is much more distinct than in the preceding harrier-hawks, and approaches very closely the condition

found in the owls, to which, however, they are by no means closely allied. The nostril in the spotted harrier is oval, while in the preceding genus it is round.

The colouring in this species is very variable according to the age or seasonal changes of the bird. The tints above are sometimes brown, more or less marked with reddish or brownish yellow; the quills and tail greyish, barred with black or brown; and the under surface a striped or blotched dark brown, or black, and yellowish-white, with a yellowish-brown ruff: sometimes black throughout, with ashy-grey and black barred wings and tail, and with white spotted facial ruff; or again this latter general character may be retained with the exception of the breast and belly, which become white with scattered spots or narrow stripes of black, more abundant on the lower breast and belly.

This is one of the commonest of the coast birds being found along all the lower or tidal parts of the main creeks, where it can be readily distinguished, when perching, by its long wings, legs and tail; but it is much more easily recognised in flight by the spread of its wings and tail, on which the numerous black and grey bars are very conspicuous. It commonly goes by the name of "snake-hawk," and is always very abundant among the bushy tree growths along the savannah streams and by swampy places, where it may pick up snakes, lizards and frogs. It is particularly abundant on the Abary, and is frequently met with in the Mahaicony and the Hoobaboo and other creeks. Occasionally it will be encountered perched on a tree, tearing to pieces some unfortunate bird, such as the awkward and slow-flying old witch or Ani cuckoo

(Crotophaga ani), the poor victim meantime crying out for dear life. They seem to congregate in small flocks of five or six, though it is not uncommon to come upon them singly, or in much larger flocks, especially in the wet weather, when they gather around the little bushy islands left in the open savannahs by the high water, to which the various animals on which they feed have been driven for shelter. They are graceful looking birds while on the wing, but they alight in a very awkward manner, their wings and tail being more or less expanded at first to prevent them from overbalancing as they settle on the branch. This is the first record of the species from the colony.

The remaining hawks, with the exception of the osprey, are all referable to the group of the buzzards, in which the tarsus, or the generally bare joint of the leg, is, as in the kites, much shorter than the upper or feathered joint (tibia), and in which the back of this bare part is covered with large plates, and not with small reticulated scales as in the kites and their allies the eagles.

The most remarkable of these is the harpy *(Thrasaetus harpyia)*. This well-known bird measures more than three feet in length, and is more strongly built than any other bird of prey. The bill and feet are very large and thick, and the talons of the toes are quite dreadful-looking weapons. It is rendered still more fierce looking by the presence of a large erectile crest on the head; and though its wings are much shorter than those of the eagles in proportion, yet they are strong and powerful organs. The colour of the adult is ashy-grey, much paler below and on the head—the quills, the tail, the top of the crest, and the fore breast, being

darker. In young examples, the back is nearly black, and there is a black band across the fore breast, with indications of black bars in many parts, especially on the legs, where the feathers project far down over the tarsus.

This bird is a true inhabitant of the forest, and ranges in this district all over the colony. They have thus been shot on the Berbice, Demerara and on the lower Essequebo rivers, and they are more particularly met with in the elevated or hilly districts, where they will occasionally be found perching on the top of some dead giant of the forest, evidently the better to scour the surrounding country for their victims. They prey on all the larger birds such as macaws, and on mammals such as the deer and sloth—the latter especially being subject to their voracity since their only chances of escape lie in their protective colouring. In stock-raising countries they are much feared, as owing to their great strength, they do not hesitate to attack and kill sheep, pigs and calves.

Though this bird, like the two following species, commonly goes by the name of *Eagle*, it does not belong to that group of birds—no true eagles being found in the colony. In the harpy, as in the next two forms, the back of the leg is covered with large plates as in the buzzards, not with small reticulated scales as in the eagles.

The so-called crested eagle *(Morphnus guianensis)*, though reaching nearly the same total length as the harpy, is readily distinguished from it by its much smaller build—the bill, body, and feet, being altogether thinner and weaker. It is a noticeable feature in the beak that the nostril is situated nearly at the top of the

mandible, while in the harpy it is nearly median in position; while in the feet, the bare tarsus is long and slender, and the toes and talons thin and weak, compared with the thick and massive corresponding parts in the harpy. The colouring of this species is very similar to that found in specimens of the harpy, the upper surface and the crest being more or less brownish-black, mottled or barred in the greater part with ashy—more especially in the long tail which is whitish at the tip and at the base, and is crossed with three distinct ashy-bars; and the under surface brownish-grey or white, more or less barred with narrow reddish-brown bands, especially on the shortfeathered thighs.

This species seems to have much about the same distribution in the colony as the harpy, being never met with actually in the coast districts—but little or nothing is known of its habits.

Very different from either of the preceding are the two species of the so-called crowned eagles *(Spizaetus)*, which both have their legs feathered to their toes. This character alone will serve at once to separate them from all the other hawks. Neither of the species occurs on the coast, but they are at times met with in the forest districts of the interior along the great rivers, where they seem to prefer the more elevated tracts or the more secluded parts. With their raised crest, which attains a length of about 3–4 inches, these birds present a very fierce appearance, quite in keeping with their habits.

In the one species, the white-breasted crowned eagle *(S. ornatus)*, of a length of from 24–28 inches, the upper

surface is black, with the quills of the wings brown and barred with blackish-brown, and the tail brown, barred with four or five blackish-brown bands. The sides of the cheeks, of the neck, and of the breast, are reddish brown, the first with a black cross band. The throat, breast, and belly white, the last closely banded with black, continued down the feathers of the legs. In the young birds, the tints are browner, and the white under surface is less barred, the centre of the body being only marked with spots of black. The head also is white.

The next species, the black-breasted crowned eagle *(S. tyrannus)*, though very closely like the foregoing in its immature stages, is distinguished by its prevailing black colour above and below, though indications of white spots or even bars may occur here and there on the under surface. In the young birds, the black is much less pronounced, the head, throat, and fore breast being white, with black lines or blotches on the latter; while the hinder parts are black with white blotches which run into bars on the flanks and legs. This species is not included in SALVIN'S revised list of the birds of British Guiana.

The remaining buzzards include some of the commonest hawks in the colony; and along the lower tidal parts of the creeks and rivers, they are the birds most frequently seen, either perching on the trees—on the highest branches or the lowest stumps—along the sides, or flying overhead, or seeking food walking with slow gait on the mud-flats. They include the well-known "grey hawks," "red hawks," "brown hawks" and "black hawks"—nearly all being denoted by the term "chicken-hawk" as well.

The commonest of these is the "grey chicken-hawk"

or great-billed buzzard *(Asturina magnirostris)*, which has already been mentioned as being the commonest hawk and of the widest distribution in the colony. It is about from 14–15 inches in length, and is readily distinguished from all others by its colouring. Above, it is of a pale slaty-brown, the feathers edged with greyish red in the young; the quills are rich red, broadly tipped and narrowly barred with black; the tail is grey, broadly barred with three or four blackish bands according to age. Below, the throat and fore breast are grey, marked or banded with whitish or reddish-brown, according to age, and passing into regularly alternating bands of brownish-red and yellowish white on the hind breast and belly, less distinct behind, but very distinct on the leg. The wings are short, not reaching back to half the length of the tail; and the concealed tubercle on the upper inner lining of the oval nostrils (the mark of the genus) is rather large.

An account has been already given of the omnivorous nature of these birds which seem to eat almost anything that comes in their way. They prey upon the bats, and especially the little long-nosed river bats *(Rhynchonycteris naso)*, which they pick off the bark of the trees along the creeks and rivers; and while they must be of great use in destroying fruit-eating bats, which they secure in the late evening before settling down for the night, and other fruit and grain-destroying mammals, such as the small opossums, and mice and other small rodents, they are pests at the same time to the poultry-yards, where they often pounce upon and carry off the chickens. They must thus be extremely destructive to the young of all birds, the more especially as they

do not hesitate to seize and tear to pieces for food the more sluggish species, such as the "old witches" or Ani cuckoos *(Crotophaga ani)*, which, from their slow and awkward flight, are more frequently caught than other forms.

As in the case of the harriers, these birds will not infrequently be found holding some living bird in their talons and tearing it to pieces, while the air resounds with the despairing cry of the victim. Not much more than a year ago while collecting on the Abary creek, our company was suddenly startled, nearly at sundown, by the most unearthly sounds it had been my lot till then to hear, and which were at once, by the more superstitious of the black crew, put down to something out of the ordinary course of human experience. Shortly after, a sudden bend of the creek brought us in sight of one of these hawks, perched on a high branch, and holding in its talons and voraciously tearing, one of the large "old witches" *(Crotophaga major)*, which meantime was filling the air with its piercing death shrieks. Wounded birds are sometimes thus seized and carried off, even though the sportsman may be standing within a few yards of the place where the bird has fallen or is struggling. A few months ago, it was my experience to witness the carrying off by one of these birds, of a yellow-backed hang-nest *(Cassicus persicus)* which had been shot, and had been caught in the creepers about a by no means high tree, into which it fell, while it struggled in its death throes. The hawk, sitting unseen in some tree close by, had evidently observed the fall of the bird, and hearing its cries and struggles, had seized the opportunity of an easy meal. It darted suddenly into

the creeper, and, ere a gun could cover it, had flown away with the dying bird.

In all parts of the colony, they are to be met with. On the outskirts of the town, or in the country districts; in the low bush, or dense tall forests of the interior; in the open savannahs, or on the high lands; along the open, sheltered or secluded creeks and rivers, or on the exposed mud flats and swamps, they are almost always to be seen, either perching on some stump or branch, walking on the ground, or flying overhead, while seeking for mammals, birds, reptiles, frogs, insects, crustaceans or worms, or even fruits and seeds, which seem to be equally acceptable. Their cry is a very characteristic one, frequently repeated as they perch, motionless, on the top of the high dead branches of some great forest tree, where doubtless they build their nests.

This is the only hawk, which, to my knowledge, having mistaken the stuffed skins of birds put out in the sun to dry, for real bodies, has ever been bold or venturesome enough to dart at them and attempt to carry them off, even in the presence of persons standing not more than a few yards from the spot.

The second species of the group, the so-called goshawk or grey-barred buzzard *(Asturina nitida)*, is also a common bird, more especially close to the town and about the estates and low lands of the various tidal creeks. These birds have much of the habits of the foregoing species, but they are much larger, being from 16–18 inches in length, much less numerous, and thus correspondingly less destructive. They are often to be observed hovering in the neighbourhood of the poultry yards in the country districts, though generally high up

in the air, and out of range. Their colouring is a very distinctive one, the whole body being regularly barred with a glossy blue and grey, or blue and white, the throat being pure white; while the quills of the wings are broadly black-tipped and narrowly barred with black; and the tail white-tipped, and barred with two white bands. In the young, brown and white tints predominate, the white being blotched or streaked with brown.

Three species of red or reddish-brown buzzards are of very common occurrence about the outskirts of the town, the estates, and the coasts districts generally. These are large birds, ranging from 18–24 inches in length according to the species and the sex. They well illustrate the difficulties that may beset the beginner in ornithological study, or one quite ignorant, in the recognition and identification of the species. Being large birds, of much the same tint of red and brown, with darker black quills and tail, they present much about the same character to the uninitiated, though indeed they differ considerably from each other.

In the commonest of these, the black-necked or white-headed buzzard or "crab-hawk" *(Busarellus nigricollis)*, the size ranges from 18-22 inches according to the sex. The colour, almost throughout, is of a clear rusty-red, with black shaft stripes on the top and on the shorter quills of the wing, which are also black-tipped; the head and throat are creamy white with black shaft-stripes; the neck is marked with a large black cross patch; the main quills of the wings are black, and the tail black at its upper half and narrowly barred at its base. The primary quills of the wings are only slightly longer than the second-

aries, the difference being less in fact than the length of the tarsus; while the toes, on their under surfaces, are covered with closely packed hard spicules (the mark of the genus) giving a very characteristic appearance to the feet, which, doubtless owing to this structure, are generally coated with mud from the mud-flats, whither these birds resort in search of crabs, shells, shrimps, fish, etc.—on which they chiefly delight to feed—and where they will frequently be met with, either on the stumps or tall trees, or on the mud-flat itself.

The second species, the black-headed buzzard (*Buteogallus æquinoctialis*), which is much about the same size, and has much about the same habits, occurrence and distribution as the preceding, is nearly black all over the head and body, the latter parts being broadly margined with rusty-red. The main quills are nearly black; the shorter quills are rusty-red with broad black tips; and the tail is black, but with white tips and an obscure band of white. The throat and foreneck are black, passing into a regularly barred black and rusty-red over the rest of the under surface. In these birds too, the difference between the longer and shorter quills of the wings is even less than in the preceding, even less indeed than the length of the hind toe.

The third species, the great-winged red buzzard (*Heterospizias meridionalis*) is larger than either of the preceding forms, being from 20–24 inches in length according to the sex. The colouring of the upper surface is blackish-brown or grey, streaked and margined with rusty-red, especially on the head. The shoulder of the wing is almost pure rusty-red, while the main primary quills of the wings are whitish, passing into rich rusty-red with broad black

tips—the tail being pale glossy black, white-tipped, and with a broad median white band. The whole under surface is rusty-red, the hinder breast being darker, shewing obscure cross bars remaining from the younger plumage in which the entire under parts are narrowly barred with brownish black.

The primary quills of the wings in this species are much longer than the secondaries, more so in fact than by the length of the tarsus; and the nostrils are round, and show a very conspicuous tubercle inside (marks of the genus).

What has been said of the habits, occurrence and distribution of the two preceding species, applies equally well to this form, which, however, seems to be a much more active bird, with stronger and more rapid flight—and it is much more frequently seen sweeping along on the wing, especially over the wet savannahs and swampy places, than either of the others.

The next species to be mentioned, the "black-hawk" or "black chicken hawk" *(Urubitinga zonura)*, will readily be known by its size and colouring. It reaches a length of from 23–25 inches, according to the sex. The colouring is black, almost throughout, with the exception of the tail and its covering feathers. The base of the tail, and a narrow tip, are white, the remaining part being black, forming a very conspicuous band; and the tail coverts are white, more or less marked with black. In the young stages, the general colour above is brown, more or less varied with a reddish tint, while the head, neck and under surface is of a reddish and whitish yellow, spotted and streaked with brown and brownish-black. The tail is pale brown, numerously banded with

a darker tint, and according to age, showing the white and black stages to the adult.

This large hawk is one of the commonest in the colony, being distributed all over the coast area. I have never met with it in the interior, nor in the forest or hilly districts; but along the estuarine parts of the great rivers, and the tidal portions of the main creeks, it is to be met with everywhere, especially about the cultivated districts near the town, and even in the neighbourhood of the town itself. It is much dreaded in the poultry yards, from which it not infrequently carries off young birds of all kinds, and being a powerful bird on the wing, it is equally able to successfully attack poultry of larger size. Its food is of a very miscellaneous character, consisting of small mammals, birds, reptiles, frogs and insects, though reptiles seem to afford its main portion. When seen on the wing, sailing as it were in the air, with only occasional flaps of the wings, it is not unlike the Aura vulture, except that the white base of the tail is very conspicuous and distinctive, and serves at once to distinguish the species from all others. The passage of this bird over or near to the poultry yard will always be noticeable owing to the peculiar clucking noise set up by the fowls, which seem to recognise instinctively an hereditary foe.

Another species of this genus, *U. anthracina*, has been recorded by Prof. CABANIS from the colony, and has, apparently on this authority since the bird has not been met with by WHITELEY, been included by SALVIN in his revised list. It has been included in the foregoing list of the hawks of British Guiana on the same authority, though the species does not occur in our Museum Col-

lection, nor indeed has ever been met with, or heard of, by me in any part of the colony.

It is like the common black hawk in every other particular except the distribution of the white and black tints on the tail and its covering feathers. The tail is described as being black, white-tipped, and with a broad white central band; while the covering feathers are black, with white edgings. As these same characters are certainly met with, more or less definitely marked, in stages of the common black hawk, it seems to me almost certain that the species here have been confounded; and that whatever specimens have been referred to *U. anthracina*, have been nothing more than special stages in the life history of *U. zonura*.

Two very beautiful species of the genus *Leucopternis* will be met with along the rivers, especially in the more wooded and secluded districts. They do not appear to occur on the cleared lands of the coast, nor on the low savannahs. Around the Indian cassava fields or deserted settlements, they will at times be found perching in the undercover or in the sheltered branches of the trees, jumping from branch to branch in search of grasshoppers, locusts, cicadas and reptiles; but I have never seen them on the exposed topmost bare branches, so much frequented by the generality of hawks. They are therefore not easy to secure, for one generally comes upon them suddenly and at close quarters, and almost before one is aware of it, the bird has jumped into some little thicket of branches and is lost from view.

These birds will readily be recognised by the predominance of white in their colouring. The entire under surface, and the head and shoulders, are white, while the

wings are black. Many of the feathers of the forebreast, and those of the head especially, are marked with black shaft stripes ; while the wings, which are quite short, are thickly spotted or blotched with white, especially in the front, and on the inner parts of the quills.

In one species, *L. albicollis*, the length is about from 20–22 inches. The white shoulder feathers are regularly black-banded near the white tips, the bands being drawn out to a point, on each side, along the shaft, and giving a very patterned appearance; and the tail is white at the base and white-tipped, the greater portion being occupied by a very broad black band.

In the second and much smaller form *L. melanops*, which is only from about 14–16 inches in length, there is much less white on the shoulders, and the tail is black, with a very distinct and rather broad band of white at about an inch from the extremity. The feathers over the ears are also black. This smaller species is much more commonly met with than the larger, and will at times be seen flying about cleared and open spaces in the forest, such as at Seba, along the Demerara river.

The small, white-fronted buzzard, *Buteola brachyura*, reaches a length of from 15–16 inches. It will readily be known by its round nostrils with a central tubercle, and by the rather long wings which reach nearly to the tip of the tail. Its colour is generally brownish-black above and white below, with partially concealed white bases to the feathers of the head and sides of the neck, a narrow frontal portion being quite white. In the younger stages, it is varied with yellowish white; while again varieties are met with in which the black spreads over the entire bird, though blotched here and there with

white on the under surface. The tail is banded with four or five dark bars.

This is the first record of this species from the colony. It does not seem to occur commonly on the coast, being apparently distributed along the bushy margins of the rivers and creeks in the interior.

Three species of the genus *Buteo* are recorded from the colony, but one only *B. albicaudatus* seems to be of common occurrence. This is a large bird of a length of about 22 inches, easily recognised by its long wings reaching beyond the tail, and its black upper surface broken by a large brownish red patch on the shoulder of the wing. The sides of the forehead are white, and the rump, tail, breast and belly are white or yellowish, narrowly banded with black, grey and reddish-brown. The throat is black, and the tail bears a broad black band nearly at the tip.

This bird is common all over the country, but especially so about the low bush near the savannah streams, such as on the Abary districts, where it is often seen floating in the air, over the flooded or swampy parts especially. Like the harrier, it goes by the common name of "snake hawk," though "big chicken hawk" is also just as commonly used.

The two other buzzards *(B. abbreviatus*, and *B. unicolor)* are not represented in the Museum collection and they are quite unknown to me. The former, according to the description given in SHARPE'S Catalogue, may be distinguished from *B. albicaudatus*, by the prevailing black of the plumage above and below, though white blotches are visible here and there owing to the concealed white bases to the feathers. The tail

also is grey, not white, and is numerously banded with black.

The last on the list is the common osprey *(Pandion haliaetus)*, which is known commonly here by the name "fish hawk." They are said to be common all along the low and water savannahs of the coast, but I have met with them only along the Abary creek, where, especially in the wet season when the country is flooded by some three or four feet of water, these hawks are met with all over the district, sailing along with rapid flight, or hovering, almost quite stationary, for a moment, and then darting, as though shot downwards into the water, to seize some fish that they have espied. Comparatively large fishes are thus seized by the birds, which seldom, if ever, miss the prey at which they have darted. I have never observed them perching in the day, but one was once shot while perching at night on the top of a tall dead branch that projected high up in the air, immediately over the rough benab in which we had camped on Tiger Island, along the Abary Creek.

The species will be recognised by many characters. It is about 24 inches in length, and of a pale brown colour throughout the upper surface, the feathers being margined with paler whitish brown, those on the head becoming white, though streaked with brown at all ages. The main quills of the wings are black, and they reach beyond the end of the tail, which is numerously barred with lighter brown. The under surface is white, the fore-breast being more or less blotched with brown. The tarsus is short and covered with very small rough scales, of a pale blue; the joint being less than half the length of the upper bone (tibia); the toes are pale blue above, covered

with very coarse spicules underneath, and furnished with long and sharp, strong talons, the outer toe being directed backwards or forwards at will.

The osprey ranges nearly all over the world, but this is the first direct record of its occurrence in British Guiana.

This completes our brief survey of this branch of our fauna. A considerable amount of work has yet to be done in this group of birds as regards their habits, food, nidification and varied changes of plumage. All over the coast districts of the colony there are individuals of sufficient education and powers of observation to be able to record interesting facts on many of these points—facts that would help largely towards a complete history of these birds; but at the same time that so many people are interested in the birds around them, as a rule they know or understand but little of their relationships. The great difficulty hitherto has been to provide the means for the easy and rapid identification of the forms obtained or noticed, so that all information gleaned, by those suitably situated for the purpose, should be referred by them to the exact species in point—a matter of deep importance, without which, confusion is sure to become worse confounded; and well meant efforts, but a hindrance, a stumbling block, and an offence. Without technicality or elaborateness of detail, the preceding brief descriptions of these birds should be sufficient for the identification of our species; and it is hoped that the attempt to bring about a ready recognition of these noble birds, will in time be productive of the needed accessions to our knowledge of their habits and life history.

Occasional Notes.

Intelligence of the Sloth.—As a contribution to the mental characteristics of the lower types of animals, the following note on the sloth possesses a certain amount of interest. A young specimen of the common two-toed sloth *(Cholœpus didactylus)* had been kept in a small ante-room of the Museum, and allowed to be at large during the day when it was under observation as it climbed about, chiefly on the railing of the stairs; but each afternoon, at a little before four o'clock, it had been placed in a box in a corner of the room and covered down for the night. In the morning the cover was simply partially removed and the sloth allowed to take its own time in coming out and climbing where it listed. This went on for about two months, when my attention was drawn by the coolie attendant to the fact that the sloth had started the habit of going of its own accord to the box and of getting in just at about the period when it was accustomed to be placed there for the night. The animal was watched; and daily, month by month, between three and four o'clock, though at varying times during that hour, the little animal started from the several places where the time found it, along the line of rails, and got into its box.

This association of ideas is rendered particularly striking from the element of time, and from the fact that the creature could hardly have regarded the box as a sleeping place, since the greater part of the day was passed in sleep outside. That an animal, even such

an one as a sloth, should have got accustomed to such a course of action, and should eventually initiate it, might have been simple enough, if it had taken place at or near sundown, for the lessening of light would be a sufficient reminder of the act; in this case, however, it was always early afternoon. Moreover, the animal was at first always lifted bodily and carried to the box, so that it had of itself recognised a separate method of reaching the place, which it had fixed in its mind—a method which was a laborious one to it since it had to clamber past quite awkward sets of objects for climbing.

Soon afterwards it quite suddenly dropped the habit, when it found that another sloth *(Bradypus tridactylus)* was always placed in the same box. And this is striking too, owing to the fact that it had never found this other sloth there when it got to the box in the afternoon, since its chamber-mate was never put in till just upon four o'clock. It had therefore arrived at the association of something unpleasant with this particular box, and had remembered it so as to lead to its avoidance when its usual time for retiring arrived. Whether it would equally have objected to the presence of another sloth of its own species, we had no means of determining; but it never revived the habit it had begun, even after the death of the other sloth, when it had always to be put in as at first.

Position of the Caruncle and Method of Song of the Bell-bird.—A good deal of misconception prevails as to the position of the caruncle in the bell-bird *(Chasmorhynchus niveus)*. Ordinarily it is stated that during the utterance of the notes of the bird, this appendage

is inflated with air and becomes erect; and in the common representations in popular books on natural history, from which so many necessarily acquire their information, this appendage is shown in this position, greatly elongated and distended, and projecting straight upward from the top of the beak. It must be confessed that this position is the one generally found in the stuffed bird, and it has given rise to the belief that it is the natural position. Recently however I have been able to examine and observe two living birds, which have been kept in the town for some time, and I have been able at the same time to note the methods in which their notes are uttered.

The caruncle is never carried upright. The erect position, in fact, is an impossible one, since the organ is made up of very fine elastic tissue, which causes it to depend lower and lower over one side of the beak during extension. When the bird is about to utter its characteristic notes, this appendage slowly becomes greatly elongated—to as much as five inches, I have observed at times. At the conclusion of the note, the organ may remain extended till the next note, or may be partially retracted; but when a long interval takes place, the structure is always allowed to shrink up to about half an inch or an inch in length, at will; and it then hangs against the beak. During extension, the caruncle is never distended with air, but is always in a state of collapse.

When the appendage is fully elongated, the bird suddenly inflates its lungs, right and left, by inhaling—almost by a swallowing action—two great draughts of air; but the method by which this is done depends upon which of its two characteristic notes it intends to utter.

When the notes "Kong-Kay" are uttered, the action of inflation has been performed by two distinct inhalations of air, one with its head turned to the right and the other immediately after to the left. At the moment of the utterance of the notes, the head is turned to the right for the "Kong," and then suddenly—so suddenly that it almost startles the observer—the head is swung round to the left for the "Kay," which is issued with a strikingly loud, piercing and metallic ring or clang—so loud and shrill indeed that, if the observer is close by, the ears are actually deafened for the moment by the sharpness of the sound.

When, however, the sweet, musical, and deeply-toned bell-like notes "Do-rong" are about to be uttered, the bird is observed simply to hold its head forward, and to make two distinct gulps of air; and then, holding its beak upwards and slightly extending its neck, the notes are rolled out, as it were, with full voice and roundness and resonance.

On each occasion, as already stated, the caruncle is depended in a state of collapse to its greatest length possible, over one side of the beak. The one bird on which the above notes were based, I may state, was a fully developed male; the second, a younger male, altogether lacked the power and strength of note of the former, whose notes were to be heard at a very considerable distance away from the house in which it was kept, in spite of the ordinary confusing noises of a town.

Growth of Young Rattlesnakes.—In a former number of this Journal (*Timehri*, Vol. v., New Series, Part. i., (June 1891), pp. 7 and 170), some notes were given

relative to the growth of two young rattlesnakes, born and bred in the Museum—and especially as to the development of their rattles. Born in October 1889, these snakes are now about $2\frac{3}{4}$ years old, and they are both of a length of nearly four feet. They have fed heartily on mice and small rats throughout the time, drinking water quite greedily at frequent intervals; and their health evidently is good. It is a curious feature that though adult rattlesnakes, brought from the country and placed in their cage, will rattle at almost the slightest tapping on the edge or when they are touched with a wire, these young snakes take no notice of such things, but only rattle when a large rat, of which they are evidently afraid, or which puts them in a state of perturbation, has been placed in the cage.

With regard to the development of the rings of the rattle, it was stated in the former account that on May 27th, 1891, the larger snake (now hardly any larger than the other) exuviated, and then possessed six rings, the three earliest rings being lost out of its nine exuviations. In the smaller, on May 4th, when change of skin took place, there were eight rings, these representing the total number of exuviations, the last portion being the characteristic elongated stump with which the little vipers are born.

Now, more than a year after, the former possesses 5 rings, though three exuviations (on August 14th and November 16th 1891, and on March 17th 1892), have taken place since May 27th 1891, at each of which an extra ring was added; while the latter has 7 rings, though four changes of skin (on July 6th, September 9th and

December 16th 1891, and on May 3rd 1892), have taken place since May 4th 1891. In the former case 4 rings have been lost during that time (on May 10th), which, with the 3 formerly lost, make up a total of 12 rings, corresponding to the total number of exuviations since birth; while in the latter, 5 rings have been lost during the time (on October 3rd 1891, the four terminal rings, with the natal button, were lost; and on April 10th, 1892 yet one more), which make up a total of 12 rings, corresponding to the total number of changes of skin from birth.

The intervals between the addition of the rings, therefore, vary considerably according to the age of the snake, becoming greater according as the snake gets older and larger; and though confinement may to some extent have modified the conditions, yet the reptiles have grown so quickly, and seem to have such healthy and hearty appetites, that it is hardly likely that it could have made very much real difference.

Viper-like Caterpillar.—Of all the many strange, grotesque and remarkable insect forms to be found in the colony, one of the most wonderful is the caterpillar of the large greenish sphinx-moth *(Argeus labrusca)* which feeds on the vine and other creeping plants. This grub is about 5 inches in length and very thick in the body, the colour of which is a dark purplish-brown, crossed above, and thickly marked at the sides, with paler brown and grey. The anterior segments of the body, when elongated, are quite small in comparison with the hinder parts, but they gradually increase in size backwards, until at the seven

or eighth segment, they are of equal thickness with the hinder parts. Into these large segments, the anterior parts are more or less retractile, giving the appearance of a more or less broadened and thickened, but quite shortened, snout. At the broadest part of this anterior portion, two large strikingly eye-like areas are situated, which, when the anterior segments are retracted, give every appearance of being the true eyes of a particularly viper-like object. The resemblance of this caterpillar to a snake, and more particularly to the venomous labarria *(Trigonocephalus atrox)*, whose colouring it also bears, is sufficiently striking to be the object of attention, and when the head of the caterpillar is suddenly perceived among the bushes of some tree close to one's body, it is sufficiently imitative of the poisonous snake to cause one to start back involuntarily.

This is one of the most striking and perfect cases of true mimicry to be met with in the colony, in which a harmless form of one group is protected by its resemblance in form and colouring to a poisonous form of another group. That this form is so protected can hardly be doubted, since the very foes that would seek it, are some of the very objects that the form it mimics would itself seek as food. Though the caterpillar has never been directly observed being eaten by birds, one can no more doubt its being palatable to birds when it has thus been protectively coloured and formed, than one can doubt that the gaudy, black, yellow-banded and red-legged caterpillar of the frangipani sphinx moth *(Pseudosphinx tetrio)* is not palatable, flaunting its colours in striking contrast on the bare grey branches or across the most green leaves, in the most conspicuous

manner possible, the better to show itself, and to prevent insect-eating birds from mistaking it for some other palatable form.

Colony Deer.—Five species of deer appear to be distributed in the colony. The common brown savannah deer *(Cariacus savannarum = C. mexicanus)* is so well known that it needs no description, the branching antlers, with the inner basal snag, sufficiently distinguishing it. The large red wood deer or brocket, with the simple horns *(Coassus rufus)*, is also well-known, being commonly obtained about the back of the estates, more especially on the Essequebo coasts. The "Welbisiri" or small wood deer or brocket *(Coassus nemorivagus)*, is common only in the forest tracts of the inner parts of the country. In spite of its being a very common species in the interior, it was only quite recently that I was able to secure a suitable specimen for accurate identification, and it seems likely that the name "Welbisiri" is given to two distinct species. *C. nemorivagus* is much smaller than the red deer, and is of a very pale brownish grey or white colour, with a frontal streak before the eyes, and the horns are much finer and shorter. The Welbisiri was referred in SCHOMBURGK'S "Reisen" to the species *C. humilis*—Benn, but it is widely separated from this form.

A species of brocket, also known as "welbisiri," is frequently mentioned by bushmen in the colony, as being much smaller than the above, scarcely larger in fact than the fawn of the red deer while it possesses the lines of pale yellowish spots. This form is said never to lose the spots of the young stage, but to retain them throughout life. It would thus appear to be distinguish-

able from the other small grey brocket, *Coassus simplicicornis,* which has been recorded from the colony by SCHOMBURGK, though it is possible that the forms with the spots which were considered adult, were only really young of this species. There is no frontal streak in *C. simplicicornis.*

A very different deer from any of the preceding is only represented in the Museum collection by a skull, the characters of which mark it as referable to *Blastocerus paludosus.* There is no inner basal snag in this form, and the antlers grow to some length ere they divide into two, about equal, branches. In our specimen these antlers are thick and very rough, but unfortunately, though it was obtained in the colony, its exact locality is not known.

The "Who-are-you."—Perhaps no writer has more graphically described the singular characteristics of the goatsuckers of Guiana than did the intrepid WATERTON of the "Wanderings." Their quaint and curious cries, so humanlike in expression, of "Who-are-you?," "Willy-come-go," "Work, work, work-to-hell," must have struck the early settlers with as much wonder and surprise, as they have since caused to every dweller in the land who has wandered beyond the actual confines of civilisation, and has passed a night in the woodlands. But though these notes are so commonly heard throughout the country, almost wherever one may camp, it is yet a most difficult matter to relate the forms to their special cries, since they are only heard at night, and then chiefly while the birds pass to and fro, or perhaps perch, in the thickets of bush around, where it is not only impossible to procure them, but even to get a sight of them.

Quite recently, however, through the kindness of Mr. ARTHUR WABY of the Botanical Department, who procured me the specimen, I have been able to identify the common "Who-are-you," and it turns out to be nothing more nor less than the very widely distributed species, *Nyctidromus albicollis*. From the fact that this is the only species of goatsucker obtainable near the houses in the Gardens, where also the "Who-are-you" cries are heard, there can be no doubt of the relation of the cries to the species of bird, the more especially as the specimen was secured as it issued from a thicket, in which, just before, the cries were being uttered.

The species will be recognised by its ashy-grey and brown soft plumage, mottled with yellowish brown, especially on the upper part of the wings; by its white patch on the throat, white bar across the wings, and white second and third quills in the tail.

Young Animals taking Refuge in the Mouth of their Parent.—For years and years, the question has been debated as regards snakes, whether the young of vipers ever take refuge in the mouth of their parent for protection; and while, on the one side, it has been argued that they do, on the other it has been as definitely stated that they do not, each side producing what it regarded as incontrovertible evidence on the point.

The opponents in the matter had this fundamental fact in their favour, that all vipers bring forth their young alive, and that if pregnant snakes be encountered and chopped across the hinder part, young snakes will be found inside, which, to the ignorant, might be a proof that the young snakes had been swallowed by the mother

for protection—even though they occurred in the uterus and not in the stomach. On the other hand, the definite statement has been made by individuals, who, one would think, would have no object or interest in mis-stating what had been observed, that they had actually *seen* the young snakes, on alarm, take refuge in the mouth of the parent; and one cannot help wondering whither the young snakes went, since the mouth could not contain them; and it would be unlikely that they would penetrate into the stomach, where the gastric juices would certainly not lead to their preservation.

Quite recently it has been stated to me by Mr. A. B. BARNARD, a pioneer miner and mining engineer of the gold industry of our colony—a gentleman of high education, and widely known for his great powers of observation, and his experience of the world,—that he had killed in the upper district of the Mazaruni a large bushmaster or Coonacoushi *(Lachesis mutus)*, from the *mouth* of which there issued several young specimens, which, from their character and markings, were evidently of the same species. There was no doubt of the fact that they came from the *mouth*, he assured me, since he himself had seen it, for I at once had suggested the other extremity of the reptile as being the only possible, or at least, the only likely place, from which they might have issued.

I give the instance as it was related, without being able to offer any explanation of the matter after the personal statement made by Mr. BARNARD; but I would further state that Mr. BARNARD was unaware of the disputed points in question, and had only brought the case under my notice as one that was quite surprising to

himself, and, as he thought, one that would interest me, as Curator of the Museum in town.

Another case to which I would refer, is not so much improbable in itself, as that it has never hitherto been stated as occurring. During 1889, a large sea devil, *(Ceratoptera vampyrus)*, now preserved in the Museum, and of about fifteen feet in width, was stranded between the piles of one of the wharves in the river. Several rifle shots were fired into the anterior part of the body by Mr. VIRTUE of Water Street, who definitely states that, during the struggles of the great fish, crowds of young devil-fishes came out of its opened mouth, and swam about, plainly visible in the shallow water. Again, in this case, there was no doubt about the extremity from which they issued, since Mr. VIRTUE states that they were seen by himself issuing from the mouth, which could not be mistaken owing to its position in relation to himself, confirmed by the great arm-like pieces, bearing the eyes. As these great fishes are viviparous, there is the likelihood of such young ones issuing from the other extremity of the body, except for the definite statement made by Mr. VIRTUE in the matter.

Venom in Harmless Snakes.—Two definite cases of the venomous action of the secretions of harmless snakes seem to me worthy of mention. In the one case it is a matter of my own experience, in which I was bitten on the first finger by a large freshly-caught specimen of the common red, white and black-banded coral snake *(Erythrolamprus venustissimus)*, which happened to grasp my first finger in such a way as to drive its hinder grooved teeth, forcing them about three times, deep down

into the flesh, the anterior teeth causing but minute punctures. Knowing the general harmlessness of the snake, I paid no attention to the bite beyond wiping the blood away—although it smarted rather sharply—until, about half-an-hour after, the finger became much swollen at the place and distinctly very painful—much more so than I was prepared for from the mere fact of the wound; and rather as if it had been stung by some of the larger wasps. The swelling became no greater, but the pain increased, and was only lessened by the application of ammonia, and it was not till about four hours afterwards that real relief was obtained, though the place was tender for a much longer time.

In the other case, the experience was that of the clerk in the Museum, who was bitten on the finger by a young specimen of the common frog or mattapi snake *(Xenodon severus)*, whose hinder enlarged movable teeth were driven deeply into the flesh, with a result similar to that described in the case of the other snake.

Frequently in handling these little harmless snakes, one may receive a bite or nip from them, but it is seldom, under the circumstances, that they have the chance of driving in their specialised hinder maxillary teeth; and the foregoing instances, in which this took place, are simply mentioned because a similar painful result has never been noticed when the bite has been given by the small anterior teeth.

There can be no question in these cases of a bad state of health; nor considering the amount and degree of pain and swelling, can the result be ascribed to the mere aceration produced. The whole effect seemed to me to be due to the fact that, in these two instances, the small

snakes were able to grasp, with their large specialised teeth, the small parts of the fingers, just as they would grasp the small animals on which they prey; and the effect produced in the small animals would be such as no doubt to cause temporary paralysis or unconsciousness, the better to enable the snake to swallow them—just as in the case of so many of the *Hymenoptera* and other such forms, the sting which is only painful and local in man and other large animals, is sufficient to paralyze, if not to kill, the small insects which they secure as food in their nests for their young—and which they are thus enabled to manipulate without trouble.

That the peculiarly painful result was caused by a specialised secretion, seems to me to be the only sane conclusion in these cases; and the fact of the teeth being grooved—in one case at least—tends to confirm this. That the glandular structures at the base of, and around, these specialised teeth secrete some specially acrid fluid or poison which bathes the tooth and becomes carried into the wound by the teeth, seems to me to be no more strange than that a very similar thing should occur in the well-known cases of the various stinging rays, where the spines, even in the water, are thus rendered highly offensive and defensive organs.

Our Coast Monsters.—The great sharks and rays of our coast are very little known, and their habits but little understood; it is hoped therefore that soon it will be possible to devote a special article to their consideration. Now, it is intended simply to record the occurrence of the larger and more striking forms. Sharks as a rule are very much feared, though certain forms are

quite harmless, so far as man is concerned; and but little damage seems as a whole to be done by them along the various coasts where they occur. Possibly at the various harbours, where their chances of picking up a stray sailor would be of the greatest, the noise and commotion caused by the shipping and steamers, may be the real means of their prevention. However that may be, it remains a fact that though several species of the most rapacious kinds are to be obtained off our coast, it is but seldom that any casualties from them are reported. People shrimping along the shores are never interfered with; boys bathing along the front of the seawall, only very occasionally are reported as being attacked; while sailors in the harbour itself, who now and then drop overboard, are almost invariably rescued, though sometimes they disappear from sight and are never seen, again—presumably sucked down by some strong undercurrent, and not seized by sharks which certainly would have shown themselves.

The most to be dreaded here are the blue shark and its allies *(Carcharias)*, and the tiger shark *(Galeocerdo)*. These seem to range here to about ten feet in length, and with a diameter of nearly two feet at their thickest part, larger specimens being never met with, though small ones are common. It seems likely that the very large examples are only to be taken in deeper water than we can boast of close to our shores. In the blue shark and its related forms, the teeth are very strong and sharp, uniformly erect and triangular, having the sides serrated either along the whole margin, along one side only, or simply at the broadened base. In the spotted and banded tiger shark, the teeth are deeply notched on

one side. In the hammer-heads *(Zygæna)*, in which the head is flat and expanded horizontally, transverse to the axis of the body, the teeth are very much finer than in the others and generally slightly recurved.

In all the above members, the teeth form a most horrid-looking armature, constantly supplied by additional rows, as they drop away or are broken ; and, apart from any driving force from the jaw, it is painful if one simply lightly rests one's bare hand upon the points of the teeth—an experiment that vividly brings to mind the peculiar cutting capacity of such jaws when they are driven by the enormous muscles that work them.

The nurse shark *(Ginglymostoma)* with small mouth very small eyes, and buccal cirrhi, seems to be a quite harmless ground shark; and though the enormous saw-fishes *(Pristis)*, or comb-fishes as they are locally named, present a most terrible sight with their rows of sharp and strong spines on the elongated snout, yet in reality they seem to be quite harmless, never attacking man, though, judging from the fact that they at times get their snout entangled in the shrimping nets of the coolie shrimpers on the mud-flats in the river, they must often be in quite close proximity to him. These monsters range to quite 25 feet in length in the harbour, and are occasionally taken; but it is remarkable that, in each case, when brought ashore, these great fishes show their stomach everted through the mouth, and quite empty of the food contents which might have guided one to some real idea of their habits, and of the uses to which they here put their dreadful armature.

The great rays are represented by eagle-rays *(Aetobatis)* and blunt-nosed rays *(Rhinoptera)* of more than

six feet in width, and many of them armed with the poisoned spine so much dreaded by fishermen and others, owing to the generally incurable wound made by it. But the monster of this sub-group is the great devil-fish or sea-devil *(Ceratoptera)*, large specimens, of about a width of 15 feet, being sometimes caught, stranded among the piles of the wharves.

As a preliminary, I append the following list of these monsters, met with in the harbour and in the immediate mouth of the river.

Carcharias glaucus	Blue	Shark
,, *porosus*	Brown	,,
,, *obscurus*	Dusky	,,
,, *brevirostris*	Short-snouted	,,
,, *oxyrhynchus*	Long-nosed	,,
Galeocerdo tigrinus	Tiger	,,
Zygaena malleus	Hammer-headed	,,
,, *tudes*	,,	,,
Ginglymostoma cirrhatum	Nurse	,,
Pristis perrotteti	Saw-fish or comb-fish	
,, *pectinatus*	,,	,,
Aetobatis narinari	Eagle-ray	
Rhinoptera quadrilobata	Cow-nosed ray	
Ceratoptera vampyrus	Sea-devil.	

Food of Sphex larvæ.—The curious habits of the *Sphegidæ*, in providing food for their helpless and footless grubs during the period when they are enclosed in the protective cases in which they undergo their metamorphosis, are well-known; and it is equally well-known that the parents select all sorts and stages of other insect forms—even to the venomed honey-bee, and the

sharp-fanged, venomed spiders—as suitable for their young, the entrapped specimens being first stupefied by the injection of the poison of the parent, so that their young should secure fresh and suitable nourishment.

The commonest of the *Sphegidæ* are well-known here, even in the town, by the common name of mason-bees, owing to the variously-formed mud structures which they make for their young, attached to stones, sticks, or generally to the rafters of the houses. In the country districts, this family is represented by a great variety of forms, many of very large size, which make their homes either in the hard clay banks or in the sandy ridges. One of the chief of these, fairly common in the higher districts of the country, is the violet and black wasp, or so-called marabunta, *Pepsis ruficornis*, which reaches a length of body of about 1½–2 inches, and is distinguished by dark wings and reddish antennæ.

Curious to relate, this form seems only to select for its young the large and hairy bird-eating spider, *Mygale avicularis*, upon which, owing to its flight, the wasp is able to settle suddenly, and to paralyze or make unconscious by its sting, before the spider has even a chance to struggle for its life. Owing to its large size and strength of body, and to the corresponding strength of its wings, the bee is able to carry off quite large specimens of the spider, and to drag them into its retreats. The large, thick and juicy body of this great spider offers a sufficient amount of food for the young of this large bee; and one cannot but be struck with the intelligence displayed by the parent in securing for its young, not simply a mass of small-bodied insects from which but a small amount of nutriment can be secured owing to the preponderance

of chitinous membranes in the small bodies, but the massive spider from which, above all others, the greatest quantity of food might be obtained for its offspring with the least expenditure of time on its own part in securing it.

The Locust Beetle.—In many of the pods to be picked up so abundantly under those great locust trees, so common in the colony, are to be found specimens of a small brownish yellow beetle *(Cryptorhynchus stigma)*. The beetle is quite a small one, less than a quarter of an inch in length, and spotted with dark blotches on the elytra, the snout being long and rounded as in the other members of the group of the weevils *(Curculionidæ)*; and when the little creature is touched, or when it has dropped to the ground from the hand, it tucks its legs under it, bends its snout under its body (hence its generic name), and feigns death, just as so many other members of its kind are accustomed to do.

The curious feature about this beetle is the peculiar similarity of its colouring to that of the yellowish mealy portion inside the pod of the locust, surrounding the dark seeds—a similarity which, if met with outside in an open situation where the beetle would be exposed to the pursuit of its foes, would be plainly explicable on the ground of natural selection, but which, in the sheltered precincts of the pod, cannot apparently be so regarded. And yet, really, the same principle seems clearly to have been at work, though its operation can only be understood by following out the history of the form.

However carefully a pod be examined, no apertures will be found at which a creature of such a size can either

make ingress or egress—traces being only occasionally found of a minute aperture at various parts of the pod, generally near the stalk. The explanation of this evidently is that the substance of the ripe pod is hard, too hard for the beetle to perforate; and the presence of the adult inside is only explicable by the fact that, when the pod is young and soft, its substance has been pierced by the female beetle for the deposition of her eggs, the larvæ from which have eaten into the substance of the pod, there to go through their metamorphosis to the adult form which one finds in the ripe pod, at which stage the original puncture has been more or less obliterated by growth.

The adult beetles are liberated eventually by the decay of the pods, which quickly takes place on the moist or wet ground, helped on by the various boring insects which attack them, and by the large ground birds which break them open, with all such rubbish on the ground, feeding on the grubs and other forms inside. Here evidently the protective colouring of the beetle comes into play and its adaptation is explained, since all forms which would be mistaken for the meal of the seeds, and more especially those which, from the dark marks upon the wings, would give the idea of the hard seed itself, would tend to be preserved from destruction, and would perpetuate those very characters to which their salvation was due.

The Avifauna of Georgetown.—In a recent number of this Journal (*Timehri*, Vol. v. New Series, Part i, June 1891, p. 69), a preliminary descriptive paper on the Native Birds of Georgetown was published, to serve as an introduction not only to the fauna of Georgetown in par-

ticular, but to the study of our birds in general. Since then, various other species have been noted, chiefly through the assiduous observation of Mr. EXLEY PERCIVAL, Principal of Queen's College; and it is not too much to say that a larger number still will yet be added to the list. At some later period, a detailed description of all these additional species will be issued, but meantime a record is here given of those at present to hand.

Emberizoides macrurus	*Campophilus melanoleucus*
Oethœca setophagoides	*Scops brasilianus*
Todirostrum maculatum	*Bubo virginianus*
Tyrannus pipiri	*Asturina nitida*
Dendrornis guttatoides	*Buteo albicaudatus*
Lophornis ornatus	*Urubitinga zonura*
Nyctidromus albicollis	*Milvago chimachima*
Chamæpelia. sp	*Thalassidroma pelagica*
Conurus pertinax	*Pelecanus fuscus.*

Peaiman's Paraphernalia.—Some few months ago, a gold expert and prospector while travelling along the Barima river, came upon the burial-place of an Indian Peaiman or Medicine-man. The house under which the burial had been made was hung round with five of the typical peaiman's rattle or shak-shak, and over the grave itself was placed the box of the dead man, containing the various objects which had been the instruments, or credentials, of his calling. The contents of this box were taken away, and proved to be of extreme interest. Two, and unfortunately the two most interesting, of the set were presented to Mr. IM THURN, the Government Agent of the district, while the rest were later on presented to the Museum.

The two presented to Mr. IM THURN consisted of a carved wooden doll, or "baby" as it was termed by the Indians familiar with it, and of a beautifully finished head which had evidently formed a part of some piece of pottery, and which, from the form and arrangement of the hair, the nose, ears, mouth and bound beard of the chin, called to mind very strongly the ancient patterns of the East, and more especially the early Egyptian.

The parts presented to the Museum consisted of various odd things, such as two old Dutch burning-glasses fitted into wire frames; large crystals of quartz —true, transparent rock-crystal—with neatly hexagonal faces and terminations; a portion of the bark of some tree; a common reddish quartz pebble; a roughly made face, evidently originally a piece of pottery on some ornamental object, and probably only rough-looking owing to its age and abrasion; and, most curious of all, a neatly carved representation, in reddish quartz, of a dog sitting on its haunches and holding its front well up. In this figure the base of the fore legs is occupied by two clearly-bored holes, into which, evidently, it had been the custom to fit strings by which to pull the little object along on the ground, just as toys are usually drawn along by small children. It would be extremely interesting to ascertain whence all these objects were obtained by the peaiman, and what were the various uses to which they were put in his calling, but, under the circumstances, it is hardly likely that any light can ever be thrown on the matter.

Guiana Land and Fresh-water Shells.—In a former number of this Journal (*Timehri,* Vol. iv., New Series,

Part. i., June 1890, p. 37), a short descriptive paper on the land and fresh water Mollusca of the colony was published, in which a revised list of 24 species was given, 22 of them being new to our fauna. Since then five other species have been added to the list, including four of *Bulimus (B. lacerta, B. alternans, B. regina* and *B. gallina sultana)* and one of *Ampullaria urceus*. Three of these are now recorded for the first time; *Bulimus gallina sultana* and *Ampullaria urceus,* having been already recorded by SCHOMBURGK in his "Reisen."

It is worthy of note, though there is nothing surprising in the fact, that the common English garden snail *(Helix aspersa)*, which has been introduced into so many different countries, has now been taken in Guiana, and it is likely that it will hereafter become a common form.

It must be noted too that the thin-shelled apple-snail, so common in the trenches about the town, which, in the paper on the Mollusca, was queried as *Ampullaria papyracea,* is now almost definitely referable to *A. amazonica*, of which it appears to be a smaller variety, the type specimen in the British Museum being much larger. This is the species which deposits the little masses of red eggs on the walls or sides of the trenches, and on the grass and other vegetation, especially the Victoria regia, growing in the water, and on which they feed—the masses of green eggs being referable to *A glauca,* the thick-shelled form. Again I have to acknowledge the kindness of Mr. EDGAR A. SMITH, the well-known conchologist of the British Museum, in naming our specimens.

New Colony Birds.—From time to time, since the publication of SALVIN'S revised list of the birds of British Guiana in the *Ibis*, various species have come to hand; I append a list of these additions for reference.

Tyrannus pipiri	*Coccygus americanus*
Chlorostilbon atala	*Picumnus spilogaster*
Malacoptila fusca	*Pyroderus orocensis*
Scops ustus	*Asio mexicanus*
Ciccaba virgata	*Buteola brachyura*
Circus maculosus	*Micrastur mirandolei*
Accipiter tinus	*Spizaetus tyrannus*
Rostrhamus leucopygus	*Falco aurantius*
Pandion haliaetus	*Cathartes urubitinga*
Ardetta exilis	*Porzana flaveiventris*
Porphyrio parvus	*Podilymbus podiceps*
Erismatura dominica	*Querquedula cyanoptera*
Thalassidroma pelagica	*Sula fusca*

Biological Station at Jamaica.—It seems certain now that the proposed Marine Biological Observatory at Jamaica will be established. The desirability of such a station in a suitable position in the tropics is so obvious, and has been already so ably stated, that little further need be said; and that Jamaica, owing to its central and uniquely favourable situation, and with its high range of hills offering opportunities of change to workers from the colder climes, has been fixed upon as the site, augurs well for the success and permanence of the movement.

It seems to us, however, that from the inception of the scheme, it would have been wiser to have adopted a wider basis—that, instead of there being simply a Marine

Biological Observatory, there should have been inaugurated a central and general Biological Station, where workers in all branches of biology, terrestrial and marine, would have had facilities for carrying on experiments and researches in all matters pertaining to the Botany and Zoology of the tropical zone.

The special work of any Biological Station will necessarily be greatly dependent on the funds at its disposal; and its utility will be considerably hampered by anything less than the most ample and generous support. That votes from the Home and Jamaica governments, supplemented by grants-in-aid from the chief of the great Learned Societies and Academic Bodies and from private persons, will be sufficient to fit up and start the Observatory, may be taken for granted; but it would have been a wise and desirable thing to have so extended the scheme as to have directly insured as well the hearty support of the governments of the surrounding Islands and States, both British and Foreign, together with that of the chief agriculturists and men of commerce.

In a highly cultured community it is unnecessary now-a-days to plead the interests and advantages of the pursuit of pure science; but away from the great centres of civilisation, the case is different. Here the leaders of commerce and the pioneers of the various industries, while they unfortunately often lack the appreciation of pure science, regarding it—as so many highly cultured, but still only partially educated people do—as "useless knowledge", yet appreciate to the full its economic applications. Nearly every, if not every, industry of the West Indies and tropical America would be benefited by extensive scientific investigation and experiment. A bio-

logical station, where *pari passu* with purely scientific work in the interests of pure science, research could be and would be carried out, for instance, into the history of the diseases of tropical plants and animals, if only limited to fungoid and insect pests, is a distinct need, and would be of such enormous practical utility as to enlist the assistance of agriculturists of all grades and of all countries.

The extension of a Biological Station to include such research would entail but a comparatively slight increase on the initial expenses of the station; since the additional fittings, both of apparatus and books, would be comparatively small. The chance here offered alone, of collecting in one central place, a complete biological and scientific library of reference, within convenient reach of all science workers in the region, is one that is more than worthy of the greatest support. That all agricultural pursuits would be benefited by the prosecution of scientific research under suitable conditions, and on a scale beyond the reach of individual communities, can hardly be doubted; and enormous potentialities for agricultural and scientific teaching would in this way be brought into existence. That such a central Biological Station would meet with the wider support of all the governments of the various Islands and States, if only on the selfish policy of its direct utility to their individual needs, may almost be taken for granted; and perhaps it is not yet too late to take into consideration the extension of the original scheme.

Sugar Cane Borers.—Little by little, contributions are being made towards the compilation of an accurate

history, as based on direct observation, of the sugar cane borers of the West Indies. More or less rivalry seems to exist between the various observers, as to the theories advocated by which to explain the liability of the cane to disease, or the sequence in which attacks are made by the various kinds of borers; but however useful such rivalry may be in stimulating observation and experiment for the ascertainment of the truth, one cannot too strongly deprecate the introduction of personal pique in such matters, or the absence of that courtesy and respect which every worker in the field of Science, so long as he labours on the recognised lines of scientific method, is not only entitled to, but should receive, from his fellow-workers. That a friendly note of warning should be sounded, will be evident to any one who has had the opportunity of consulting certain recent numbers of the *Barbados Agricultural Reporter*, in which letters on the cane borers have been published.

A considerable amount of confusion seems to prevail in connection with the cane borers. A certain amount of this is evidently due to want of familiarity on the part of many of the observers with the various kinds of organisms dealt with; again to want of comprehension of their conditions of life, the more especially as influenced by changes in their environment; and yet again to hasty conclusions, and even generalisations, based on isolated facts. The result is seen in the lax use of the term "cane borer," when one out of several different insects is intended; and in the confusion of the moth and beetle forms—directly as regards their larvæ, and indirectly from the various perforations made by them. A further source of confusion, and a fertile one

is the ascription to coleopterous forms which are found present in a cane, of a damage really initiated by moth forms which at the time of observation are absent. The period of the moth-borer attack may be almost called a transient one, since after their metamorphosis the moths take wing and fly away, leaving no certain record behind them except perhaps to one who is really very familiar with their depredations. The beetles, *as a rule*, taking advantage of the resulting weakness caused by the moth-borers, settle in the diseased cane, and, so to speak, make a home there, and may there go through a long life history. They may thus be called permanent as contrasted with the moths. The finding of such forms does not *necessarily* explain the origin of the damage—and nothing but continuous observation, with the most careful determination, of the larvæ at first observed, can place the matter on any sound basis.

Mr G. W. SMITH, Curator of the Government Botanic Gardens of Grenada (*Barbados Agricultural Reporter*, March 29th, 1892), from direct observation, has thus far made the most valuable contribution to the subject. Mr. T. D. A. COCKERELL, Curator of the Institute of Jamaica (*Bulletin of the Botanical Department of Jamaica*, April 1892), has followed with a compilation from various sources giving a very valuable and detailed account of the commonest of the moth borers of the sugar-cane (*Diatræa saccharalis*—Fabr.); but, unfortunately, the opportunity of field-work on the pest, and personal familiarity with its history, which would have given a special and critical value to the summary, seems to have been wanting to the author.

Mr. J. H. HART, Superintendent of the Botanic

Gardens, Trinidad, (*Barbados Agricultural Reporter*, June 7th, 1892), has stated his opinion that the original cause of the disease (of the sugar cane) is a microscopic fungus; and though this is both startling and suggestive in relation to the theory of ferments and the part which bacillary and other organisms play in so many, and till recently, little known fields of disease; yet it must be stated that no evidence on the presence and action of the fungus seems to have been produced, though the simple mounting of a piece of the diseased cane under consideration ought to have at least shown conclusively the presence of such growths. We, however, eagerly await the publication of the evidence on which Mr. HART bases his opinion.

More and more attention is being given to economic entomology throughout the world; and the prosecution of researches in the West Indies, the more especially on our staple plant, cannot fail to be productive of a great deal of information that will be of direct practical value.

Report of the Meetings of the Society.

Meeting held on 14th January.—Hon. A. Weber, President, in the chair.

There were 16 members present.

The Chairman said that before proceeding to the business of the meeting, he thought it would be better to ask them to adjourn until the following Wednesday, on account of the death of the Duke of Clarence, the news of which had just arrived by cable. In view of this sad occurrence, and in sympathy with Her Majesty, the Queen, who as they all knew, was Patroness of the Society, he thought they should postpone all ordinary business and have an address to Her Majesty and the Prince and Princess of Wales prepared and submitted to the adjourned meeting.

Mr. Watt then moved and Mr. Conrad seconded, that the standing orders be suspended, and on this being carried, the Chairman moved that the business of the meeting be postponed until the following Wednesday, which was also agreed to unanimously.

Mr. Watt suggested that the President and Mr. Winter be deputed to prepare an address of condolence. Mr. Winter excused himself and suggested that Canon Moulder be appointed.

Mr. Blair moved and Mr. Max seconded, that the following telegraphic message:—"From the Royal Agricultural Society, British Guiana, to Secretary of State Colonies, London. Convey to Queen and Royal Family profound sympathy," be forwarded at once, which was carried.

Mr. Darnell Davis was then added to the Committee appointed to prepare the address and the meeting terminated.

Meeting held on 25th January.—Hon. A. Weber, President, in the chair.

There were 14 members present.

Elections.—*Members:* Mr. J. A. Murdoch and Dr. Gomes.

Associates: Messrs. Robt. T. Brand Junr., E. G. Woolford, F. D Gummer, S. Davis, H. C. Swan, R. Fowler, Wm. McCowan, M. L. R. Andrade, G. S. Vyle and P. L. Tengeley.

The President said that as it was usual for the Chairman to address the first General Meeting after his election, he would therefore follow the custom and say a few words. He thanked them for the honour they had conferred upon him, and hoped to justify their confidence by giving his best attention to the many important matters likely to come before their Meetings. Among these was the great question of "Opening up the Country," which opening would have to take place, so that the riches of the interior might be available. Another matter which would presently engage their attention was that of Jewish colonisation, which he hoped would receive careful consideration. Then there would be the preparation of exhibits for the Chicago Exposition, the representation of the colony at which would certainly be a benefit either directly or indirectly. They required capital, and the Americans had it. If the products of the colony were developed, which development he thought would follow on their judicious adver-

tising, he had no doubt considerable improvements would take place, and an industrial population of the right kind ultimately result.

Theirs was the only society in the colony which concerned itself with the general progress of the country. It was a literary institution as well as a scientific, agricultural and commercial society. Unlike so many other similar bodies, which had existed for but a short time, theirs had held up its head for nearly half a century. It was now in its forty-eighth year, and they would soon have to think of celebrating their jubilee. There had been Agricultural and Philosophical societies previous to the year 1844 when the late Mr. Campbell set to work and started this Society. The Demerara and Essequebo Agricultural Society came to grief some three years before. The meetings were in the planters' houses and usually after dinner, when the Members discussed the burning questions of the day, emancipation and the differential duties. The founders of the present Society thought it better to exclude political discussion from their Meetings, with the result that, although these were perhaps a little tamer than some others, there were fewer causes of dissension. Mr. Davis told them at the last Meeting that he should like to see the Society worthy of its name, both as regards Agriculture and Commerce. He (the President) would like it to be that and something more—a Society from which, not only planters and merchants, but artisans and labourers, could derive benefit. This was already to a certain extent the case with the Society's Museum, which was the resort of thousands of all classes of the community. He hoped they would have some good

papers read at the Meetings, that the Popular Lectures would be continued, and that a good record would be shown during the present year.

Mr. Garnett thanked the Members for electing him to the office of Honorary Secretary, which he promised to do his best to fill satisfactorily.

The Treasurer laid over his Financial Statement (next page) and List of Members for 1891. There was a balance in hand which he thought should be used to provide more accommodation for the Museum. The Curator had been wanting a work-room for a long time and had been much hampered on this account. He (Mr. Conyers) also stated that the Government grant in aid of the Museum was barely sufficient to keep up the collection, and he thought it high time the amount was increased.

The Financial Statement having been adopted, Mr. Winter proposed and Mr. Hawtayne seconded that the sum of $1,500 be spent on the Museum as suggested by Mr. Conyers, which was carried.

Mr. Blair then proposed and Mr. Hawtayne seconded, that the Society apply to Government for an increase of the annual grant for the Museum from $4,500 to $6,000 which was also carried.

The Secretary read a letter from the Committee of Correspondence, informing the meeting that Mr. G. H. Hawtayne, C.M.G., and Mr. John Duke Smith, had been elected Chairman and Vice-Chairman for 1892. The Committee recommended that something should be done for the Museum and forwarded the Curator's report (annexed). A copy of this report was ordered to be forwarded to the Government with the application for an increase of the grant.

The Royal Agricultural and Commercial Society of British Guiana.—Receipts and Expenditure for the Year 1891.

RECEIPTS.

To Society's Funds, 31st Decr., 1890			$ 1,788 68
„ Subscriptions—			
Lady Subscribers ...	$ 87 50		
Ordinary Members ...	1,820 00		
Country Members ...	490 00		
Associates	957 50	$ 3,355 00	
„ Arrear Subscriptions ...		42 50	
„ Rents		2,556 00	
„ Catalogues		33 40	
„ Interest on Scrip... ...	56 40		
„ Profit from Hand-in-Hand...	1,097 43	1,153 83	7,140 73
„ From the Govt. towards Columbian Exposition ...		5,000 00	
„ New fittings for Museum:— Balance from last pear ...		717 52	5,717 52
			$ 14,646 93

EXPENDITURE.

By Salaries			$ 2,555 00
„ Periodicals and Magazines	$ 516 12		
„ Less Sales of Papers, &c.	45 00	471 12	
„ New Books added to Library		682 09	
„ Binding		40 32	
„ Advertising, Stationery, and Sub'tion to Local Papers...		209 80	
„ Cost of Painting and Repairing Buildings ...		1,783 76	
„ Cost of Timehri, 2 Parts to 30th June, 1891 ...	533 10		
Less Sales by Thomson, $258 35: less Sales by Stanford, London, $21 76	280 11	252 99	
„ Insurance with Hand-in-Hand Buildings and Contents $50,000 at 1¾ o/o ...		875 00	
„ New Furniture and Repairs		92 26	
„ Postage, Petty and Reading Room Expenses... ...		183 92	$ 7,146 26
At Cr. Columbian Exposition A/ct		5,000 00	
Paid for new fittings for Museum	251 63		
At Cr, new fittings A/ct for Museum	465 89	717 52	5,717 52
			$ 12,863 78
Society's Fund per Balance Sheet			1,783 15
			$ 14,646 93

The Secretary reported that the Agricultural and Commercial Committees had met and elected Office-Bearers for 1892 as follows:—

Agricultural Committee: Chairman, W. A. Wolseley, Vice-Chairman, S. M. Bellairs; Secretary, J. Gillespie.

Commercial Committee: Chairman, J. J. Dare; Vice-Chairman, W. H. Sherlock; Secretary, Jacob Conrad.

The Secretary laid over a draft of the following letter of condolence to the Queen and Royal Family on the death of the Duke of Clarence and Avondale, which had been agreed to by the Committee appointed at the previous meeting:—

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

May it please your Majesty,—We, the President, Office-Bearers and Members of the Royal Agricultural and Commercial Society of British Guiana, desire to offer to your Majesty, our Patron, and to their Royal Highnesses the Prince and Princess of Wales, our heartfelt sympathy in the great affliction which has fallen upon you and your Royal House by the death of His Royal Highness the Duke of Clarence and Avondale, in the early years of his manhood, and on the eve of a Happy Union full of the brightest promise for his future.

We desire also to assure your Majesty, and their Royal Highnesses the Prince and Princess of Wales, that we share in the profound and universal sorrow with which the British Empire mourns the irreparable loss which you and Your Royal House, and the Nation at large, have sustained by his early death.

On behalf of The Society. } A. WEBER, President. GEO. GARNETT, Secretary.

Georgetown, British Guiana.

On the motion of Mr. Blair, seconded by Dr. Carroll it was ordered to be engrossed and forwarded through the Governor. Dr. Carroll said he could not help expressing on behalf of the Government which he represented, the deep sorrow and sympathy felt in con-

nection with the sad event by all in the United States, from the President downward.

The Secretary said that the next matter for consideration was the question whether the Society should apply to Government for funds to hold a local exhibition about August next.

The President having stated that such an exhibition was desirable to help the Columbian Exposition, Mr. Conyers moved and Mr. Winter seconded, that an exhibition be held and that application be made to Government for a sum of four thousand dollars. Mr. Blair was against asking the Government for funds at present, while the Revd. W. B. Ritchie, thought a show of the exhibits for the World's Fair might be made at little expense. Mr. Hawtayne spoke of the little interest taken in the local exhibitions and asked whether it would not be just as well to procure exhibits for Chicago from those willing to produce them. He suggested that the matter should be referred to the Committee of Correspondence for report as to the desirability or otherwise of such an exhibition, which was accordingly done.

The Report of the Jews' Colonisation Committee was postponed until the next meeting on account of the absence of Mr. Max.

A document on the boundary question between French and Dutch Guiana, which had been translated by Mr. H. L. Christiani was laid on the table, the thanks of the Society being accorded to the translator.

The President gave notice of motion as follows :—

"That this Society take into consideration and make arrangements to carry out the establishment of an Agricultural School for the agricultural education of the peasantry of this colony, to be under the supervision of the Society."

The thanks of the Society were accorded for the following donations :—

From U. S. Government through Dr. Carroll.—30 Vols. Departmental Reports and a number of Pamphlets.

„ The Commissioner of Mines, Nova Scotia.—Copies of Mining Law and 2 Pamphlets on Mining.

„ G. W. Childs, Philadelphia.—A Copy of his "Recollections."

Mr. Hawtayne exhibited photographs of pictured rocks and the crater of a volcano at St. Vincent.

The meeting then terminated.

REPORT ON THE MUSEUM FOR 1891.

Arrangement.—The general and detailed arrangement of specimens has been proceeded with, the more particularly as rendered necessary by the various additions which have been incorporated. Particular attention has been given in this respect to the cases of Minerals, Ethnology, Fishes and Osteology. A typical and illustrative collection of the minerals and rocks of the colony, made up of a small and picked set of each kind, from different districts where possible, shewing the real structure and the weathered surfaces, has been sorted out and arranged in a special case, as a mineralogical guide to students, and to those engaged in prospecting and travelling in the Interior. The Mattés collections of metalloplastic casts of Fishes, have been unmounted from their small flat cases in which they were mixed up with shells, seaweeds and ferns, and have been placed appropriately in wall-cases, with such labels as were easy to determine, but as the common names attached by the maker are Dutch terms, used locally in Surinam, and as the exact specific characters are not in many

cases shown, the work of determination is rendered thereby very doubtful.

The reserve collection of Birds, which now numbers about 2,000 specimens (exclusive of the specimens exhibited in the cases), has been entirely revised and rearranged, so as to be easily available for reference or study—and similar work is about to be taken in hand for other groups, particularly that of Insects. This group presents a case of most exceptional difficulty, for apart from the lack of assistance in the Colony, no writer in recent times has yet been able to devote time except to extremely scrappy descriptions of the Guiana forms. This lack of descriptive work is a sore trouble to the systematist, and renders it almost essential in all cases that specimens be sent to the United States or to Europe for identification and comparison with named series. This difficulty is not easily overcome, for if large collections be sent, persons can scarcely be got to undertake their quick and certain identification, and then only by the retention of the specimens which are thus lost to the Museum; or if paid assistance be obtained, this is often costly and but little to be relied on for specific accuracy. Something, however, is being done with the group, and I trust that at a not very distant date, it will have been made possible to have a well arranged and classified set. The larval stages and development of many of these forms are quite unknown, and as a commencement towards a contribution to the history of the Guiana Insects, an attempt is being made to get together coloured figures of the early stages of the Lepidoptera, to be published later on with descriptive sheets. In this connection it gives me special pleasure to acknowledge

with gratitude the ready assistance and promises of help of various ladies, and notably Miss Lucas and Mrs. Fred. White, whose artistic accomplishments have aided me where my own capabilities were sadly deficient.

Revision of the groups of the Chelonia, Crocodilia, Selachia, and of many groups of Birds, has also been accomplished, so far as based on Museum specimens.

Sets of special and desirable specimens have been forwarded to London to be mounted, and are now due back from the taxidermist. Sets of new flat exhibition cases, and cabinet and insect cases, are in course of construction, to be paid for out of the remainder of the special funds collected by Mr. Hawtayne, during his Presidency, for Museum cases and fittings.

Conservation.—The conservation of specimens which yearly occupies a considerable portion of the time of the staff, has been carried on as far as possible. The older as well as the newer parts of the collection, require constant inspection and attention, due primarily to the marked changes of weather, with the consequent development of moulds and mildews, and to the incursion of various minute and hardy insects. The badly fitted doors of the old upright cases are also responsible for a great deal of the extra attention, since the vapour of the napthalene, used as an insecticide in the cases, readily diffuses out through the wide interspaces along the fittings of the doors. The accessions among the Mammals, Birds, Reptiles, and Fishes, have been skinned and preserved, and in many cases mounted and incorporated in the exhibited series. Various osteological preparations, chiefly the skulls of various types, have been made; and the Insect collection has been

kept in decent order, and the greater number of the acquisitions set. Sets of new specimen bottles, paid for from the funds collected by Mr. Hawtayne, have been purchased and will be available for a spirit collection. A considerable difficulty is met with in the department of conservation, owing to the utter want of trained assistants, and to the lack of suitable grounds and appliances at the Museum Buildings for the purposes in hand. Many necessary operations are altogether impossible under such conditions.

Registration.—The specimens acquired by purchase, exchange or presentation, have all been registered so as to allow of ready reference to the history of each—the donor, the locality and time of acquisition being specified.

Clerical and Literary.—The clerical work of the department is a by no means unimportant one. The time of the clerk is largely occupied in the renewal of labels which quickly deteriorate, and becoming discoloured by the action of the humidity and brightness of the atmosphere, are unsuitable for the exhibited series.

The intra and extra-colonial correspondence takes up a considerable portion of the Curator's time, which is further occupied with writing for and editing the Journal of the Society.

Travelling Expeditions.—Various short expeditions for special purposes have been undertaken and satisfactorily accomplished during the year, such as trips along, or to, the Demerara river, the Abary, Mahaicony, the Mahaica and Hoobaboo creeks, and Bartica Grove.

The general examination of the hills about the Malali

rapids where there were said to be present the remains of craters of extinct volcanoes, is worthy of mention, in that the formation was due to igneous action (volcanic) so commonly to be met with over different parts of the colony, though the crater-like depressions were attributable to the secondary action of denudation, rather than to the primary igneous disruption. The longer expeditions along the Mahaicony and Abary creeks were undertaken chiefly for procuring specimens of the little known bird, the Fin-foot *(Heliornis fulica)*, examples of which were required for dissection in order to determine its real affinities. Owing to the extremely wet season the special bird was not met with along the Abary, though later on, they were secured along the Mahaicony. On both trips, however, large numbers of desirable specimens of many different classes were procured and preserved—though the wetness of the season greatly hampered one's operations.

Acquisitions.—During the year a very considerable number of specimens have been acquired by presentation, some of which are extremely interesting in character. Various valuable specimens have also been purchased, the most important of which is a named set of several species of birds, collected in the Rupununi district and prepared by the noted bird collector, Mr. Henry Whiteley. Many others such as rare land boas, rare tortoises, a fine specimen of ornamental feather work, and rare and desirable specimens of birds, insects, and fishes, together with a set of Indian or native pottery, have also been thus acquired. Some valuable old colonial coins, such as "cut bits" have also been secured from Mr. Fred. McConnell in exchange for duplicate skins of birds.

Among the donors of specimens, the following are chiefly to be mentioned:—

Messrs. Quintin Hogg, C. A. Lloyd, C. W. Johnston, J. Junor and G. S. Jenman; Mrs. Jenman; Dr. Anderson; Messrs. F. A. Conyers, A. das nevers e Mello, F. das nevers e Mello, E. L. Wickham, B. G. Ross, and R. T. Kaufmann, Dr. Law; Sir Charles Bruce, K C.M.G.; Messrs. R. O. Odlum, A. Shanks, J. Wilkie, A. G. Stubbs, B. V. Abraham junr., F. McConnel, J. Waby, A. Waby, Felix Smith and R. S. Cochran; Dr. Castor, Revd. S. Grant; Capt. Farrier; Capt. Hatfield; Capt. Arnot; Dr. Von Winckler; Messrs. G. C. Bruce, M. McTurk, G. H. Hawtayne, C.M.G., C. S. Smith, A. W. Ord, J. B. Harrison, W. L. Pryce, H. I. Perkins, S. Hargreaves, R. Seyler, E. Swan, F. W. Kersting, W. L. Collins, H. Duncan, C. Duncan, W. Evans, B. H. Jones, J. Rodway, J. J. Hütte, G. H. Spence, J. Laver, J. S. Tucker, J. Cozier, and C. Bromley; Capt. Powles; Inspectors Greene and Harragin; Sheriff Hewick; Rev. T. A. Stephenson; Baron Siccama; Miss Matthews; Master Bertie Jardine; Messrs. M. H. Simpson, T. Wilson, E. Gilkes, P. H. Elliot, C. W. Anderson, H. W. Burrowes, S. Coronel, F. White, A. Kirton, W. E. Fowler, Jacobus Hill junr., B. J. Greaves, L. Tengely, B. Gemmel, J. Kelleman, J. Sargant, J. Sealy, R. J. Abraham, J. Lopes, Sheriff Kirke and Mr. E. Garnett.

Among the specimens presented, the following may be chiefly referred to:—

Minerology.—Small and rough Diamonds from Australia, Brazil, and South Africa; diamondiferous clay, sand and gravel, and two small diamonds from the Mazaruni; Gold quartz from the Potaro: White sap-

phires from the Mazaruni; Selenite from the Grenadines; Asphaltum from Barbados; Stalactites from Bermuda; Garnet in granite from Dalli; Rock-crystal; Ferruginous clay; pink clay; Gas graphite; Plumbago.

Ethnology.—Unique stone adze from the Demerara R., Jasper pebble used by the Indians to smooth pottery; Indian grinding stone; various stone Implements; Shak-shak; Queyu; Feather-crowns; clubs; blow-pipe; Shell-implements from Barbados.

Mammals.—Red Kihibee; Vampire Fruit-eating bats and other fruit-eaters; Maipurie; Quata and other monkeys; rare and common species of Opossums, Armadilloes; Otters; Spiny Rats; Ant-bears; Squirrel, crab-dog, foxes etc. from the Colony. Whale's teeth from the S. Atlantic.

Birds.—Harpy Eagle, Goshawk and other rare species, Red Ibises, rare Woodpeckers and Royal Fly-catchers, Rare humming-birds with nests; and Pelicans —all from the Colony.

Bald-headed Crow from W. Africa; Starling from England; Large expanded wings of great Albatross from S. Atlantic.

On collecting trips, the following were obtained: species of Herons, such as the so called White and Blue Crane, and Blue and White Gaulding; Heri; Negrocop; true and tiger Bitterns, Quaaks, Boat bills, Hoatzins with nest, young and eggs; Rails, Crakes, Ducks, Pigeons, Ducklars, Cormorants, Kingfishers, Woodpeckers, Cuckoos, Jacamars, Barbets, Trogons, Great Witches, Swallows, Humming-birds, Parrots, Macaws, Bill-birds, Hangnests, Shrikes, Tanagers, Chatterers, Finches, Creepers, Game-birds, and Hawks etc.

Collections of Birds' eggs from the Colony and from Europe.

Reptiles.—Boas, rare and common, alive and as skins; Crotaline vipers; and many varied forms of ordinary Colubrine snakes. Very rare species of tortoises, kept in the Aquarium. Rare and uncommon species of Alligators—many of the above from collecting trips.

Fishes.—Tiger Shark; Flute-mouth; Sunfishes; Dawalla; Yarrow; Hoorie; Pacumah, living Electric Eels, etc.

Shells.—Rare and common Guiana land and fresh-water shells, such as Ampullaria, Bulimus, Stenogyra; Mixed shells from Barbados; and a small collection from England, named.

Insects.—Miscellaneous collections, of all the chief groups, including very many rare and large species.

Coins.—Small collections of colonial and foreign coins, chiefly copper.

Stamps.—Mixed, more or less recent specimens, colonial and foreign.

Miscellaneous.—Chinese tea bottle; Plantain fibre cloth; Manilla fibre; Section of various cables, electric light, telephone, and telegraph; Collection of pottery from the Vreed-en-ruste Works, Demerara.

General Remarks.—The foregoing general account of the work done in the Museum during the past-year will serve to show its very varied nature, and the miscellaneous duties which have to be performed and controlled. The want of a properly trained assistant, familiar with taxidermic methods, and the general mounting and preparation of skins, skeletons etc. and the modelling of specimens, is keenly felt, and the

progress of the Museum is greatly impeded thereby; while the necessity of a suitable working room, properly fitted, so urgently insisted upon in my last and previous reports, has still to be brought to your notice. The need of a technical library furnishes another hindrance to the exact performance of special work: and these three desiderata, together make up a difficulty which few, if indeed any one, can estimate to the degree from which the Curator suffers from it.

I am greatly pleased to be able to report that one of the chief difficulties formerly experienced, that is, the proper supervision and charge of the Museum during the hours when it is thrown open to the public, has been remedied through the kindness of the Inspector-General of Police, who has given directions that the Museum is to be treated as one of the chief points for duty by special officers. This was rendered necessary here, as in the large public Museums generally, by the large numbers of visitors of all classes: and to us, with a very small and already insufficient staff, the presence of a police officer is not only a relief, but a definite assistance, since it sets free the time of the Curator, from a sort of general police supervision, for the performance of special Museum work which he alone can at present perform.

The Institution is now opened every day of the week; to the public, free; and during the past year was open for 337 days, having been closed on the first 26 Sundays and on Christmas Day and Good Friday, but opened on the public Bank holidays, and on every Sunday since June. On Mondays it is open from 10 a.m.—4 p.m.,

on other week days from 11 a.m. to 4 p.m., and on Sundays from 3 to 5 p.m. The late opening on the ordinary week days is due to the necessity of having the earlier part of the day for the cleaning of the place, and of securing a certain time each day during which the technical work of the Museum, such as the arrangement, revision and incorporation of specimens, may be carried out without disturbance; though the time is shortened on Monday for the convenience of the coolies in particular, who, on that day, visit the place in large numbers, and wait for the opening of the door often from an early hour. During the earlier part of the day, however, from 8 o'clock onwards, strangers to the town and even residents who have special reasons for seeking admission, can always gain entrance by application at the door, and, of course, the members of the Society and their friends, by passing through the Reading Rooms.

The Sunday opening, up to the present, has been quite satisfactory though the number of visitors varies considerably from week to week.

The total number of visitors for the year amounts to 111,605 persons, made up of 50,394 of mixed classes, who wrote or were capable of writing their names in the Visitor's Book (exclusive of children); 43,353 Coolies; 2,352 Chinese; 1,631 Native Indians; and 13,875 School Children—or an average of 331 persons per day. It must be pointed out, however, that these large nnmbers are made up by frequent visits of the same persons, more especially Coolies, Chinese, Native Indians, School Children, and people from the country districts generally, who, when they come to town, almost invariably visit the Museum with their friends, very many of the same faces

being frequently seen from week to week, or month to month. The new immigrants and those returning to India thus visit the Museum by hundreds from day to day while they are in town, and seem to take, like the other visitors generally, a real interest in what they see. This frequent visiting by the same people is largely due to the fact that the Museum is the only public place in which a large collection of things unfamiliar to their ordinary experience can be seen at leisure, and to the very great variety of the specimens exhibited, so that at each visit, something so to speak new strikes the attention; while, as is well-known, there are actually new things being constantly added.

The general charge of, and responsibility for, the place is an important one; and a great deal of the time of the staff, and chiefly of the Curator, is taken up with the furnishing information, often in the character of demonstrations, to groups of visitors, a very large proportion of whom are quite unable to derive any information from labels. In such a place, and with such conditions, this is a necessary and important feature in the work of the Museum, and it tends greatly to popularise the exhibits.

The institution is thus becoming a great educational establishment, and is yearly developing into a more important factor in the life of the colony. The improvements in the place have steadily increased, as may be seen by the most casual inspection, and this is proved by the increasing appreciation of the large number of visitors. A more generous encouragement of the institution, as regards funds, is greatly needed, and such encouragement would open out wide possibilities. It seeks to deserve and is deserving of more cordial support, and considering

the public functions it is performing, and the extension of which it is capable, it is but right that the annual vote which has been stationary for very many years, should be increased with the increased requirements. It is at the least unfair that, as a public institution, it should be labouring under such disadvantages as a want of trained assistance, and of proper working rooms and suitable appliances, which increased funds could remedy. Private donations are not to be always relied upon, though, in this way, Mr. Hawtayne succeeded, by appealing to the more wealthy members of the community, in giving an impetus to the institution which its progress illustrates. By fulfilling a public function, and that an ever increasing and important one, it deserves that public recognition which can best be shown by an increased vote of the public funds for its maintenance and development.

J. J. QUELCH,
Curator.

Meeting held on the 11th February.—Hon. A. Weber, President, in the chair.

There were 16 members present.

The President declared that the Report of the Jews' Colonisation Committee was open for discussion, the Report having been again read.

Mr. Bayley spoke in favour of the project, and thought there should be no hesitation in giving the Jews a trial, as if they should turn out well it would be much better than spending so much on the passages and back passages of coolies. He moved the adoption of the report, and that the Society should lay the matter before the Government, asking that some action should be taken.

Mr. Æneas D. Mackay, in seconding the motion, said he hoped the members of the Society would consider the question on its merits, and not be influenced by what had lately been written in the local papers, antagonistic to the proposed settlers. It had been stated that the Jews were not agriculturists. Mr. Max said they were, and Baron Hirsch wanted land for a settlement; this would hardly be necessary if they were only pedlars.

Mr. Max read a letter from the Secretary of the Jewish Colonisation Association, in answer to his report on the desirability of these people settling in the colony. The Secretary stated that he could not give an immediate answer, but would reply later. In a conversation with Mr. im Thurn, that gentleman said he would be very glad to see some of these people in the District as there was plenty of arable and pasture land for thousands of settlers.

Messrs. Winter, Jacob Conrad, J. D. Smith and the Honourable N. Darnell Davis supported the motion. The President doubted whether they would be able to stand the climate, especially if they came from the colder parts of Russia, on which Mr. Max stated that there were very hot regions in the south of that vast country which did not compare favourably with British Guiana.

The motion was carried unanimously and the Secretary directed to forward the Report of the Committee with Mr. Max's letter, to the Government.

Mr. Davis then moved and Mr. Conrad seconded, that Mr. im Thurn, who was about to visit England, should be requested, on behalf of the Society, to see Baron Hirsch and represent to him the conditions of life,

and the climate of the colony, and more especially in the North Western District, and its suitability to the Jews. This was also carried, the Secretary being directed to write to Mr. im Thurn.

The Secretary read a letter from the Committee of Correspondence stating that the question of the advisability of holding a local exhibition this year had been considered, and they were of opinion that there should be no such exhibition, but that the specimens collected for Chicago should be exhibited here within a reasonable time of their being forwarded to the Columbian Exposition.

The report having been adopted, the President said one of the reasons why an exhibition was not recommended was because the Government were unable to assist them. It now remained for the Exposition Committee to do their best to bring together such a collection as would be an honour to the colony. He would mention that two thousand square feet of floor space had been allowed to British Guiana, that arrangements had already been made to collect specimens of natural history, fibres, and medicines, and that some Indian curios had been bought. He hoped the various Sub-Committees would procure the best specimens in their own classes, to obtain which they should be assisted, not only by members of the Society, but by all the inhabitants of the Colony. The exhibition ought to be looked upon from a business point of view, for, if they were properly represented, and had a good show, it would be beneficial to the country. These exhibits would be made known to a people who would probably take more interest in them than any other nation. They wanted Ame-

rican capital in the country, and could only secure it by showing the Americans what the colony could produce. He would suggest that an Indian family and a bush scene with animals should be sent to add to the interest of the Court and take away the tameness of such things as sugar, rum, fibres, &c. Among other things he hoped that the gold industry would be properly represented, and that every gold-digger would do his best to make that portion interesting. They would have to set to work quickly if a creditable show was expected, and he hoped the Committees would work together to this end.

Mr. Smith suggested that the Society should ask the Government to appoint a Commissioner or Commissioners at once, as the sooner he or they were appointed the better for the Exposition. The Committee of Correspondence thought that only one Commissioner should be appointed, who would be responsible for the whole exhibition as far as this colony was concerned, but who might have an Assistant.

Mr. Mackay thought that as the Government had authorised the Society to arrange for the Exposition, the meeting should recommend a Commissioner.

It was agreed that the matter be referred to the Exposition Committee, which could make a nomination to the Government.

The Secretary read a letter from the Government acknowledging the receipt of the Address of Condolence to Her Majesty the Queen and the Royal Family, and stating that it had been forwarded to Her Majesty's Principal Secretary of State for the Colonies.

The Secretary read another letter from the Government, in reply to the application for an increased grant

for the Museum. His Excellency regretted that he was unable "at the present time to propose an increase of the grant made in aid of the Museum."

The motion of the President for an Agricultural School was laid over.

A letter was read from Mr. R. S. Mitchell, Calcutta, offering to send fresh samples of paddy to replace those which arrived over a year ago, and which did not germinate.

Mr. Quelch explained that a large number of moths had come out of the samples which had been retained for the Museum, and he presumed that the germs of the seed had been killed by the larvæ of these.

The thanks of the Society were ordered to be sent to Mr. Mitchell for his promise of new seed, and the Secretary was directed to inform him of the circumstance mentioned by Mr. Quelch.

The meeting then terminated.

Meeting held on the 10th March.—Hon. A. Weber, President, in the chair.

There were 17 members present.

Elections.—*Associates:* Messrs. Alex. Shanks, Walter Hales, W. H. Prentice, and G. H. McLellan.

The President's motion proposing the establishment of an Agricultural School was further postponed, as he had not yet had time to go into the matter properly.

A letter from the Government Secretary was read, acknowledging the receipt of the Society's communication in regard to the immigration of Russian Jews, and stating that it would receive the Governor's consideration.

A second letter from the Government Secretary was

also read acquainting the Society that the Secretary of State had acknowledged the receipt of its Address of Condolence on the death of H.R.H. the Duke of Clarence and Avondale, and informed His Excellency that he would have the melancholy satisfaction of laying the address before Her Majesty, who had already commanded His Lordship to express her gratitude for the loyal and kindly sympathy evinced by the colony—a gratitude which was entirely shared by Their Royal Highnesses the Prince and Princess of Wales and the Royal Family.

The Secretary read a communication from Mr. E. F. im Thurn in which he stated that he would be happy to put himself in communication with Baron Hirsch on the question of Jewish immigration. (No action was taken in this matter, as the Government had rejected the proposals of the Society.)

The Secretary read a letter from Mr. Hugh Sproston Junr., in reply to a request for information as to any alterations in the depth of the channels, tides, and coast line of the colony. Mr. Sproston stated that he had forwarded an extract of the letter to the captains of his steamers, with instructions to furnish whatever information they obtain from time to time. The Secretary was directed to forward the thanks of the Society to Mr. Sproston.

A petition was read from Mr. Christian J. London, of Friend's Retreat, Berbice, asking for assistance in rebuilding his small sugar factory which had been destroyed by fire.

The Secretary was directed to inform Mr. London that the Society regretted they had no funds at their disposal for such a purpose.

Mr. T. S. Hargreaves read a paper on the Gold Industry.*

The President proposed a vote of thanks to Mr. Hargreaves for his interesting paper; this was seconded by Mr. Winter and heartily accorded.

The thanks of the Society were accorded to the Secretary, Crown Lands Office, South Australia; Commissioner of Mines, Natal; and Assistant Commissioner of Crown Lands, Cape of Good Hope, for copies of the Mining Laws of their respective colonies.

Mr. Quelch, Curator of the Museum, exhibited a specimen of a new cane pest, which had lately been discovered in Barbados and other West Indian islands. It was the *Xyleborus perforans*, well known as a borer of casks, etc., and only lately discovered as a destroyer of cacao plants in Surinam and sugar canes in the West Indies.

The meeting then terminated.

Meeting held on the 14th April.—Hon. A. Weber President, in the chair.

There were 12 members present.

Elections.—*Members:* Messrs. J. E. Hewick and E. Lydon.

Associates: Messrs. H. P. A. Moore, and E. F. C. C. Belmonte.

Mr. Hargreaves gave notice of motion to the effect:—

"That New Books be open to engagements by the members while lying on the table, to prevent disputes on the morning of their first issue, the prior engagement giving the first claim to the book."

A letter from the Government Secretary was read, addressed to the President and informing him in refer-

* Printed on page 110.—ED

ence to his interview with the Governor, that His Excellency had appointed Messrs. B. Howell Jones and J. J. Quelch to be respectively Commissioner and Secretary to represent the colony at the World's Columbian Exposition, and that the Government would sanction the payment of their expenses from the funds placed at the Society's disposal for Exposition purposes.

The Secretary read a letter from the Royal Veterinary College, London, in reply to a communication from the Society in regard to the cattle disease on the East Coast. Professor Macqueen had examined the slide of blood of one of the diseased animals which had been forwarded by the Society, and found it to contain a number of bacilli resembling those of anthrax, but could not give a definite opinion as to the nature of the disease without making some inoculations.

The Secretary stated that the letter had already been shown to the Commission which had been appointed by the Government to deal with the matter, and Mr. Daly remarked that the Commission was now closed and had sent in its report.

Mr. Darnell Davis thought that something more than a microscopic slide should have been sent so as to have obtained a definite report. Mr. Quelch said the reply was as satisfactory as could be obtained, confirming the opinion of those who had investigated the disease in the Colony.

The Secretary read a letter from Mr. R. S. Mitchell, Calcutta, advising the shipment of twenty-one samples of paddy rice per ship *Lena*. The thanks of the Society were accorded to Mr. Mitchell, and the manner of disposing of the samples left to the Agricultural Committee.

The Secretary read a paper by Mr. Nevile Lubbock, entitled "Some Notes on the Washington Mission" (annexed), for which a vote of thanks was accorded.

The thanks of the Society were also accorded for the following donations :—

Mr. Nevile Lubbock (for procuring) Catalogue of Library of Colonial Institute, and Catalogues of Periodicals from the Bodleian Library.

Mr. Claude Francis—Mercantile Register of the United States.

The Governments of British Columbia, Victoria, Queensland, Western Australia, New South Wales and New Zealand—Copies of Mining Laws, Regulations and Reports.

Mr. Nevile Lubbock having kindly offered for acceptance a number of the Proceedings of the Statistical Society from 1883 to 1890, the Secretary was directed to write to Mr. Lubbock accepting the offer with thanks.

The meeting then terminated.

"SOME NOTES ON THE WASHINGTON MISSION."

Throughout the year 1891, a great deal of interest was taken in the possible action of the United States Government under Section 3, commonly called the Reciprocity clause, of the McKinley Tariff Act. In most of the West Indian Colonies it seems to have been thought that the West India Committee in London would do what was necessary to move the Colonial Office to act in good time, should action become necessary. The view of the West India Committee in the early part of the year was that practically the ability of the President to take action under the Reciprocity Clause of the

McKinley Act depended mainly upon the course adopted by Spain. It was thought that if Spain refused to make a Treaty with the United States, the President would hardly resort to such an extreme measure as taxing Cuban sugar. Still less would we have been disposed to re-impose taxation on German as well as Cuban sugar. If Germany and Spain had agreed together, it seems probable that they might have been masters of the situation. When, however, it was found that a Treaty had been actually concluded between Spain and the United States, it appeared to the West India Committee that the time for action had arrived, and they thereupon, in August, 1891, urged upon the Colonial Office that Sir Julian Pauncefote should be instructed to submit the tariffs of the West Indian Colonies to the United States Government, with the expression of a hope that they would be recognised as reciprocally fair and reasonable.

After an interview which I had with Lord Salisbury, at which Lord Knutsford, Lord Gormanston, and Sir Walter Sendall, were present, the suggestion of the West India Committee was acted upon.

In the meantime both before and after the interview with Lord Salisbury, a desire had been expressed that I should be nominated to proceed to Washington to assist Her Majesty's Minister in the conduct of the negotiations. It will be remembered that I had represented the colonies in a similar capacity during the negotiations of 1884, and so far as I am aware, those negotiations met with general approval in the colonies. I was disinclined however, to undertake this new duty, chiefly because there seemed a want of concerted action

on the part of the colonies. It also necessarily involved the sacrifice of many business engagements, and was in other ways inconvenient, and I did not wish to be subject to this sacrifice and inconvenience unless I had a reasonable prospect of being able to do some real service to the colonies. I felt that a delegate should be in a position to speak for all the colonies, and that there should be a common policy and not a number of separate delegations possibly bidding, so to speak, against each other.

I was aware, of course, that the British Guiana and Trinidad Legislatures had passed Resolutions under which I could have acted for them; but Barbados and Jamaica, having shown an intention to proceed separately, I had made up my mind on the 24th October to stand aside, so that each colony might have its own delegate. The strongest pressure was however, brought to bear upon me by West Indian friends in the United Kingdom, who were becoming very anxious as to the probable closing of sugar markets in the States if such arrangement were made. Lord Knutsford personally urged me to proceed, and on receipt of a kind and pressing note from his Lordship, I finally accepted the nomination on behalf of British Guiana, Trinidad, the Windward and Leeward Islands. This was on Tuesday, the 27th October. On the following Saturday, the 31st, I embarked on board the steamship *Umbria*, accompanied by Mr. James L. Ohlson, the Secretary of the West India Committee, and provided with the necessary Blue Books and papers.

On Monday, the 9th November, I reported myself to Her Majesty's Minister at the Legation in Washington.

I was received most cordially by Sir Julian Pauncefote, who showed at once a thorough mastery of the question, and explained the communication, which had already taken place between himself and the United States Government. It appeared that Sir Julian, under instructions from Lord Salisbury, had submitted the tariffs of the West India Colonies to the United States Government, together with some remarks explaining that the tariffs were levied for revenue purposes only; that the duties levied were the same, no matter from what country the dutiable products were imported, and expressing the hope that the President would recognise their fairness, and be able to give an assurance that sugars from the West Indies would continue to be admitted free. In reply to this communication a lengthy rejoinder had been received from Mr. Blaine, going into the question in great detail, complaining that though the tariffs were ostensibly the same for all they did in fact discriminate heavily against the United States. Numerous instances were quoted, derived almost entirely from the Jamaica tariff, but complaining that the tariffs of the other colonies all showed a similar state of things, merely varying in degree; that the President would not therefore accept the tariffs as satisfactory, and would assuredly have to take action after the 1st. January, unless some agreement was come to; and adding an expression of readiness on the part of the United States Government to enter into negotiations with this object. This was the position of matters on my arrival at Washington.

Sir Julian took an early opportunity to introduce me to Mr. Blaine, with whom I had some general conversation on the McKinley Tariff. Mr. Blaine told me

he remembered my negotiations in 1884, and was friendly and courteous. He would not discuss the question of the West Indies, but referred me to General J. W. Foster, the late United States Minister to Spain, to whom he introduced me, and with whom all the subsequent negotiations took place.

I found that General Foster was well posted as to the Colonies and their affairs, and had the most elaborate statistics ready to his hand. He first alluded to the delay which had taken place. He said his Government considered that sufficient notice had been given of the intention to enforce the reciprocity clause by the consular communications in the earlier part of the year. He expressed himself, however, quite satisfied with the explanations I offered. He gave me clearly to understand, in the most positive terms, that the duties would be enforced against all countries not making a reciprocity arrangement. The point was then settled, after considerable argument, that no exclusive treatment was to be given, but that all countries were to be treated alike in regard to their imports into the colonies, although we were told that this would not be in accordance with the policy of the United States as shown in previous arrangements under the clause.

The general character of the tariffs was then reviewed and every effort was made to convince General Foster that they were not reciprocally unequal and unreasonable, but were fair and just to all. He still kept to his position, which, in regard to British Guiana, will be stated later on.

In the meantime the very important preliminary question arose as to whether these negotiations were to be

upon the basis of Mr. West's proposition of 1884. General Foster strongly pressed this, but I pointed out that it was impossible. Things were entirely changed. In 1884 the colonies expected a great advantage and were prepared to make considerable sacrifices of revenue. Now, they would only be placed upon the same footing as every other sugar producing country in the world. The reciprocity clause of the present Tariff Act applies to countries producing and exporting sugar, etc., to the United States. There is no limitation as to the countries. In 1884, as shown by the despatches presented to Parliament, the negotiations were confined by the United States to "its neighbours of the American Continent." It is, indeed, abundantly clear that the United States Government had no intention in 1884 of granting the advantages of the free admission of sugar either to European countries or to the colonies of those countries in the East. Such a limitation as was proposed in 1884 would have involved the exclusion from such reciprocity agreements of more than two-thirds of the known sugar production of the world. General Foster, after much discussion, agreed to consider the Schedules of items afresh. Thus a most important point was gained and the success of the negotiations became possible. Another concession was also granted which might have proved of some consequence to British Guiana. This was, that in case the negotiations failed, the reciprocity clause would not be enforced before the 1st February, 1892.

The detailed consideration of the new Schedules was then entered upon. The case of the United States against the Tariffs generally may be illustrated by General Foster's contention with regard to British

Guiana. Broadly stated it was as follows: The statistics showed that during the year ending June 30th, 1891, there was imported to the United States from British Guiana products to the value of $4,883,206. Of these products the sum of $12,946 was dutiable. For the same period the exports from the United States to British Guiana amounted to $1,761,350. Of this amount fully 90 per cent. paid duty. This was regarded as an unequal and unreasonable state of trade between the two countries. But this inequality became more apparent when the tariff of Guiana was examined. The principal articles of exportation from the United States to that colony, with the rate of respective duty, were as follows:—Flour, 23½ per cent.; pork, 23 per cent.; lumber, 13 per cent.; beef, 28 per cent.; kerosine, 189 per cent.; tobacco, 353 per cent.; butter and substitutes, 13¼ per cent. It was believed that the statistics of trade of the United Kingdom with Guiana would show that the leading articles of exports therefrom paid on their introduction into Guiana the *ad valorem* rate of 7 per cent. fixed in the tariff, and it would also be found that a considerable portion of those exports were on the free list. General Foster maintained, as a reasonable and just claim, that in view of the treatment which was extended to the products of Guiana on their importation into the United States, American merchandize should be admitted into British Guiana at a rate of duty at least as favourable as that collected on goods from any other country, and that similar treatment should be extended in the free list.

The above urged with much ability and persistency by General Foster, was a formidable complaint to answer,

and caused much anxious thought. With regard to the balance of trade the reply was two-fold; first, that it should be regarded from an Imperial point of view and not from the standpoint of trade with a single colony. The United States undoubtedly took more produce from British Guiana than they sent to it; but the balance of trade between the United States and the British Empire was enormously in favour of the former. And secondly the above figures referred to a period before the new tariff, with regard to sugar imported into the United States, could have had any effect in increasing the trade from the United States to the colony, and so making things more equal. The economical arguments on this question of the balance of trade were threshed out.

It could not be denied that the United States had a fair ground of complaint as to the heavier duties on their products than on imports from other countries. Every assurance was given, and apparently accepted, that there was no intention of discrimination against the United States. It was strongly urged that they had the monopoly of the trade in certain important articles, and no mere reduction of duty would cause a larger consumption of those articles in the colonies.

Another important question was that of the duty on tobacco. General Foster was very strong upon the importance to the United States of a reduction of the duty on tobacco, especially leaf tobacco. This was an item I had to strenuously contend for, and General Foster finally gave it up.

The question of the Free List was then entered upon and occupied several days. This list originally comprised 90 items; some of these were struck off at my request

as involving considerable revenue. Several additional items were proposed by General Foster, and finally the present moderate list of 58 items was agreed to. I found great difficulty in tracing many of these articles in the existing dutiable or non-dutiable articles enumerated in the Blue Book, or to ascertain under what more general denominations in the tariff some of the articles mentioned in the proposed Free List might possibly be included. But after careful consideration, I think my estimate of possible loss of revenue under the Free List will be found to be ample. I understand however, that the Free List, from the point of view of the United States, was considered of great importance, apart from the question of the amount of duty involved.

The question of the reduced duties on principal American imports led to much discussion. I urged that the rates of duty were equal on the articles concerned, come from what country they might, and I opposed any reduction. General Foster replied that the tariffs discriminated against United States goods in favour of British goods. The former were taxed from 23 to 200 and 300 per cent., instancing flour, oils and tobacco as against 7 or 8 per cent. upon English linens, cotton and hardware. He wanted the same percentage of duty upon American as upon British or other goods. I pointed out that while clothing was essential to the people, flour and other imported provisions were not, as there were other articles of food grown in the colonies themselves. General Foster insisted that no such irregularities existed in the tariffs of Cuba and San Domingo. He finally asked what I had to suggest. I said I considered a 10 per cent. reduction of the present

duties upon principal American imports was as much as the colonies would be inclined to grant. This he at once declared to be quite inadmissible, and adhered to his request for a 50 per cent. reduction. I assured him that the loss of revenue would be so great that the colonies could never consent to it. After a protracted interview on Saturday, 14th November, in which all the arguments bearing on the question were exhausted, the further consideration was adjourned. Discussions were renewed in the following week. General Foster produced his 50 per cent. reduction list, which however did not now contain the item of tobacco. This was an important concession, but the proposed schedule as it stood would still have caused a loss to British Guiana alone of £90 000. I again urged the impossibility of accepting this, and General Foster at last suggested dividing the schedule into two parts; the one being a 50 per cent.; the other a 25 per cent. schedule. By the 27th November the Barbados delegates had arrived. They cordially supported me in the proceedings I had taken, and after some further interview the three schedules as finally agreed were provisionally accepted. I obtained through Sir Julian Pauncefote the consent of the Governors in reply to telegrams stating amounts to be given up under the schedules, and I left Washington on December 9th, feeling confident that in the hands of Her Majesty's Minister, the remaining official steps would be taken without delay, and the matter carried through to a satisfactory conclusion.

I have confined this rather hurried paper exclusively to British Guiana. There are many interesting points relating to the other colonies which might be discussed. My relations with General Foster were always very

friendly, and I appreciated his ability and special knowledge. I can only trust that what has been done will be generally approved in the colonies I represented, and that the reduction of the duties on imported food will benefit all classes.

Finally, I have again to acknowledge the courtesy of Sir Julian Pauncefote. He was always ready to receive me, and clear away any difficulty that had arisen. His statesmanlike views and proceedings on behalf of the British colonies were of the most essential importance and service to those colonies, and they may rest assured that no better or more energetic representative of their interests could be found than Her Britannic Majesty's present Minister in Washington.

Meeting held on the 12th May.—Hon. A. Weber, President, in the chair.

There were 12 members present.

Elections.—*Associates:* Messrs. Clarence King, John Mejlander, F. S. Waldron and Augusto Pinaud.

The Treasurer laid over the annual list of members and associates in arrear of their subscriptions, whose names were struck off the roll in accordance with the rules. The Treasurer said that several of the persons had made use of the rooms, and all had received notices, while some had been called upon for their subscriptions but had paid no attention. He was sorry to see these names struck off, and also sorry to find that some members had taken exception to his sending them notices. He understood that some of them were under the impression that the rules under which he acted were novel, whereas on the contrary they had been in existence since

1856. He asked that in accordance with these rules the list be posted up in the Reading Room.

The Assistant Secretary was accordingly directed to post up the list.

In the absence of Mr. Hargreaves, his motion to allow New Books to be engaged while lying on the table, was postponed.

Mr. Watt called attention to the absence of any report of the Exposition Committee. He thought such a report should be laid before the meeting with a view to interest people in what was being done.

The President thought it a good suggestion and asked the Secretary of the Committee to prepare a report for the next meeting.

The thanks of the Society were accorded to Rev. W. Harper Campbell for two portraits of William Wilberforce.

The President said he should like to revive the Popular Science Lectures, and would be glad if the Members would do something to that end.

Mr. Kirke suggested that a list of the Members able to give lectures should be made out and that these be written to to ask them to favour the Society at their earliest convenience. The President promised to do what he could and directed the Assistant Secretary to make out such a list as proposed and write to the gentlemen.

Mr. Quelch asked if there would be any objection to his exhibiting the copies of Pictures by the Old Masters in the Museum on Sunday afternoons.

The matter was referred to the Directors.

Mr. Quelch reported having received from Mr. and

Mrs. Collier a donation to the Museum of a number of silver coins, which would form the nucleus of a collection, and, he hoped, be followed by other donations of a similar nature. The thanks of the Society were accorded to the donors.

The Hon. N. Darnell Davis asked whether any information could be obtained as to the amount of coin in circulation throughout the colony. A gentleman in England was writing a book on the currency of the West Indies and wanted to procure this information among other things.

The President promised to try and procure the information.

The Meeting then terminated.

Meeting held on the 9th June.—Hon. A. Weber, President, in the chair.

There were 8 members present.

Elections.—*Associates:* Mr. J. C. Kruger and Henry Chatterton.

The Secretary read the annexed report on the work of the Exposition Committees.

Mr. Conrad called attention to that part of the report bearing on the insufficiency of the funds, and thought the Government should be asked to lend $10,000 to be paid after sale of some of the exhibits.

The President said this might be considered at a later stage when the Government might perhaps lend the money.

The Secretary reported having made arrangements for a new series of Popular Lectures to begin in July and include not only science, but also subjects connected with art and literature, history and geography.

The motion of Mr. Hargreaves, to allow "New Books" to be engaged while lying on the table, was then brought forward, the mover saying he found great difficulty in getting a new book, from the number of persons going early on Thursday morning (the day of issue) and securing them. He thought if they were allowed to be engaged, there would be a better opportunity for everyone, but he would only put it as a suggestion.

This having been seconded by Mr. Conrad, the Librarian said the only difficulty was in the fact that, as the books were not delivered to Members, sometimes an engaged work might be kept out of circulation for several days waiting for some one to send for it. He also thought that when a book was engaged, another should be returned, so that it could be charged at once, which could not be done when a Member had his full number.

The motion was carried and left to the Directors for modification according to the suggestions of the Librarian.

The thanks of the Society were accorded to the following:—

Mr. Neville Lubbock for 33 parts Proceedings of the Statistical Society.

Government of Barbados for Blue Book for 1891.

Professor J. B. Harrison for Papers on the Geology of Barbados.

E. A. V. Abraham for a number of Coins for the Museum.

The Meeting then terminated.

EXHIBITION COMMITTEE REPORT.

In compliance with the direction of the Columbian

Exposition General Committee, I have the honour to report to the Society as follows :—

It will be remembered that in October last the Government authorised the Society to undertake the management of affairs in conection with the representation of the colony at the Columbian Exposition, and that the President at the general meeting held on the 8th of that month informed them that a General Committee was in course of formation. The Committee having met, ten sub-committees to collect the various classes of exhibits, were elected, who were requested to draw up lists of their respective requirements and the probable cost. This was done, the estimates amounting to about $12,000. Meanwhile the Combined Court had granted $20,000, and the General Committee appointed three of their number to allot half that sum to the sub-committees, the remainder being set aside to pay the other expenses, including Secretary and stationery, freight of exhibits, passage and expenses of Commission, decoration and fitting up of Court, and cost of a family of Indians.

Doubts were expressed as to the possibility of making a proper show with the amount at disposal, and it was proved that, if necessary, a loan should be negotiated, to be paid from the proceeds of the sale of some of the exhibits. Already this difficulty has begun to appear, as the Literary Committee have agreed to prepare a Hand-Book at a cost of more than the amount allotted to them. Of course the greater portion of this will be refunded, but the facts remain that it may be necessary to spend more than the amount of the Government Grant.

Some difficulty occurred at the beginning on account

of the Chicago Directorate ruling that the various exhibits should go into the building of their classes, so that the show of British Guiana would have been split up into several divisions. The Committee objected strongly to this, saying that in such a case the colony would not be represented at all, but there would simply be a show of timber, minerals or sugar. After some correspondence it was at last agreed that space should be granted for a British Guiana Court, where all the exhibits could be brought together, this to be sixty feet long and thirty wide, with half the same area in addition for the Indian benabs, &c., and their occupants.

The various sub-committees all set to work to put matters in train for procuring exhibits. Some arranged to collect at once, others, such as those for perishable sugars and food substances, thinking it better to wait until the last quarter of the year. Up to the present, arrangements have been made for exhibits of ethnology and natural history, timber and their manufacture. Under the auspices of the Consul of Portugal, Senhor das nevers e Mello, an auxiliary Committee of Portuguese colonists has agreed to collect some of the articles for which our fellow citizens of that nationality are famed. That more show is not being made, is due to the fact that there is a difficulty in connection with the stowage of exhibits which will become serious a few months hence. A few articles are stowed in the new gallery of the Museum, but this will only suit small things, while for the heavy timbers, a shed will have to be erected on the mud lot near Messrs. De Jonge & Smith's premises, the use of

which has been granted by the Mayor and Town Council. With the smaller and heavier articles thus disposed of, there will still be a number of things to be stored, and as they cannot be packed until after the show has been held here, it will be a matter for serious consideration. The Committee has decided to have an exhibition of the articles before sending them away, and it has been proposed that it should be fitted up as it is intended to be at Chicago. This is hardly possible as it would be very expensive to take cases from here while the difficulty of fixing up the timber exhibit for one or two days would be very great. As this will form a large portion of the show, and together with the forest scene and Indian benabs, be almost impossible to put in order here, the main features will necessarily be absent.

The General Committee has decided to send eight or ten Indians with their benabs, and all furnishings, utensils and weapons, so that they may live as nearly as possible as if in their forest home. Mr. Howell Jones, who with Mr. Quelch, has received a Commission from the Governor, to represent the Colony intends to go to Chicago in time for the Columbian Celebration of October 12th this year, and while there will make all possible arrangements to facilitate matters for next year. On his return he will probably have something to report to the Society.

An exhibit of quartz, pay dirt, and possibly gold nuggets, is being prepared by the sub-committee of that section, as well as models showing the export of gold in different years. Under their direction I have written to some of the principal persons interested in the gold

industry asking for specimens of earth, clay pebbles, quartz, &c., from the diggings, and although I have had few promises no doubt a number of typical specimens will be procured. Every possible effort should be made to make this an important section of the exhibit, as it would no doubt tend to bring capital and people to the Colony.

The Literary Committee has prepared a Hand Book giving a general account of the colony and its resources, which they hope will prove useful and be a lasting memento, in the hands of those who buy the copies, of the British Guiana Court.

Although the Committees may be said to have put matters on a sound basis, they cannot make a good show without help from others. They would therefore ask the Members of the Society, and the public at large, to assist them in procuring the best specimens of everything. Extra-large cocoa-nuts, and cobs of Indian corn, fine samples of rice, starches, oils, cassareeps, &c., or specimens of the handiwork of different races, will all be acceptable. The Committees are prepared to pay any reasonable expense in connection with these, and to supply bottles for the liquids. In the next six months almost everything will have to be collected, and there may be articles now in season which are not procurable at the end of the year; this must be considered in connection with preserves &c.

Nothing that has been done hitherto at other exhibitions as far as this colony is concerned, will come near to the exhibit at Chicago if the plans of the various Committees are carried out in their entirety, but at the present stage it is impossible to do more than hope

that no unforeseen difficulties may crop up, and that the assistance asked for from various quarters may not be denied.

J. RODWAY,
Secretary Exposition Committee.

The Struggle for Life in the Swamp.

By James Rodway, F.L.S.

IT is evident to the most casual observer that a grand struggle for life is going on in the forest. Every tree is an emblem of strength, and if there is a difficulty in conceiving them wielding their immense arms in a fight, there is none in a belief that the forest giants offer passive resistance to each other. This is not so obvious in the swamp. How can these apparently weak, limp creatures carry on anything like a struggle? Floods come and wrench them away in myriads; at one season they are deluged with water, and at another dry and withered in the fierce rays of a tropical sun. Yet they live on and cover miles and miles of open country, although apparently killed off by every drought and decimated annually by the great floods. That they still exist is however the strongest proof of a wealth of resource perhaps exceeding that of the forest trees.

In looking over a stretch of English meadow in all its beauty of grass and flowers, few can appreciate that every species has been fitting itself for this annual show through countless generations. In temperate climates the winter brings rest, but as the sun's light and heat grow stronger and stronger, every plant strives with might and main to attain a position and keep it until the ruthless scythe cuts them down. And woe betide the species which has not ripened its seeds before that catastrophe takes place—it loses its position and has to

sink into the background, or perhaps take to the dusty roadside or barren down.

If this annual fight goes on under the comparatively dull skies of temperate countries, how much more intense it must be in the tropics. Here the sun shines every day in the year and even in showery weather pours down his rays almost immediately after a downpour to which the heaviest thunderstorm of Europe is a mere nothing. Some drops rise up into a mist over the savannah, but the greater portion of the rainfall has penetrated the mat of vegetation and goes to build up the jungle of sedges, grasses and flowering plants which covers the swamp. Here is no footing for man or beast, nor does the mower interfere, but nature is left to herself, save once now and again during a drought when accidentally or purposely the then dry grasses are fired.

Behind the narrow fringe of cultivated land on the coast of British Guiana, a number of such swamps extend from the back-dams of the estates to where on the rising ground the forest begins. To the casual observer they are great meadows, with hardly a shrub or flower to break the expanse of green sedges. They are commonly called *wet* savannahs to distinguish them from the more dry grassy plains to which the name of savannah properly belongs. Whether wet or dry, these expanses are always very uneven. To walk on them is most distressing even when they are dry, as the sedges grow in tufts which rise two or three feet above the narrow channels between.

If they are difficult to traverse when dry, how much more so when wet. Unless the water is very high indeed even the Indian's canoe can hardly make way over the

hummocks and tangle of vegetation. It is true that hardly anyone cares to attempt such a feat, but the sportsman, ornithologist, and the botanist will do this if occasion requires. A wounded bird, or a doubtful plant perched under the canopy of an eta palm, sometimes induces efforts to penetrate, but rarely with the desired result. If the water is two or three feet deep, the bateau is brought as near as the hummocks will allow, and taking a paddle to steady himself in walking, the enthusiastic collector steps overboard. If a new-comer he may perhaps undress, but the more experienced sportsman knows better than to expose his naked skin to the sharp leaves through which he has to push his way.

Those who have never tried walking under such conditions can hardly conceive its difficulty. Under foot is a slippery ooze which occupies the bottom of the swamp but only level for a foot or two between the hummocks. Now in deep water, and a little later almost up to the surface, he stumbles along, sometimes falling against a clump of razor grass and then slipping and going down almost flat in the mud and ooze. If the distance is short and the object can be seen from the bateau, he may succeed in reaching it, but if on the contrary it is a case of wandering round in search of a bird, success is almost impossible, and the ardent sportsman comes back in a most draggled condition, thoroughly exhausted, and bleeding from gashes in the hands and scratches on the face made by the horrible razor grass.

In places that are comparatively dry the jungle is so dense as to be almost impenetrable. Here it is possible to walk after a fashion by bearing down everything in

the way. But this is such hard work that few would ever attempt it, and if they did so could hardly find anything even at a few score yards. A tree might be seen from the bateau, but from the deep-cutting-like track, opened out as they press forward, nothing save the sky above is visible, and hardly any task is so difficult as to find a way where there is no conspicuous object in view. Even with the compass a straight line is almost impossible. The jungle nearly closes as you pass, hemming you in on every side until an intense feeling of loneliness and isolation is experienced. There is only one thing to be said in favour of such a place, the track is not easily missed as it is as much more conspicuous than a similar path across a meadow, as the grasses here are taller and more luxuriant.

The power to endure flooding is conspicuous among the native plants of Guiana. None of the cultivated vegetables or fruit trees have this faculty to any great extent, but most of them are very impatient of water about their roots. The grasses and sedges of the swamp on the contrary delight in it aud do not suffer in the least provided there is but little current. In still water they grow up and flourish above the surface, whether it is a few inches in depth or as many feet. None, however appear to like the running stream or to allow their leaves to lie flat on the water, although at least one species floats on the surface. Grasses and forest trees have been developed on entirely different lines. A tree or shrub generally exposes as great a surface as possible to the sunlight by extending its branches on all sides. The grass or sedge on the contrary throws up its long and narrow leaves in such a

manner that no single ribbon overshadows another. Which gains most light is doubtful—nature shows that the same object may be attained in several different ways. A grass with narrow leaves and no bushy expansion is undoubtedly best fitted for the swamp, as it makes little resistance to the rise and fall of the water.

How close these sedges press against each other. In some places the razor grass is absolutely impenetrable. When cut the lower part is found bleached, showing that the leaves grow so thickly as to shut out the light from below. This is the great species of razor grass (Scleria) —that horrid "touch-me-not" of the swamp which cuts like the sharpest steel instrument if interfered with. In some places it is king of the swamp. For miles nothing else is allowed to grow,—no quadruped or snake can penetrate its recesses. Provided with fine saws on both edges of the leaf and on their keels, even the thick-skinned tapir can hardly force its way through it. As to the delicate water plants they have not the slightest chance, but must leave the field to the conqueror.

All the herbivorous animals of Guiana are more or less amphibious. The largest rodent, the capybara or water-baas, is at home in the swamp, as are also its cousins the labba and acourie, as well as the tapir. But the great razor grass defies them all, none daring to touch it except perhaps after a fire when the young leaves first begin to sprout. It is therefore left alone and allowed to hold its position against all outsiders, both animal and vegetable.

The soil in the swamp is covered for a depth of two or three feet, with a kind of peat called pegass. Unlike peat however it is not fibrous but an oozy brown slime

consisting of layers of vegetable matter one above another. After a long drought the sedges get dry and their outer leaves wither, while the pegass becomes springy under foot and sinks several inches at every step. At such times the smallest spark may set it on fire. The flames run along from tuft to tuft, spluttering here and crackling there, now rising into flame and everywhere giving out dense columns of smoke. Not only are the dry sedges burnt but the surface of the pegass as well, which sometimes continues to smoulder for a week. In the day the flames are hardly visible, but the incessant spitting, sharp reports like pistol shots, and clouds of smoke show unmistakably what is going on. At night however a savannah on fire is a magnificent spectacle. Then the glow may be seen for a long distance if no forest is in the way, lighting up the horizon like a rosy sunset.

After the fire nothing but an irregular charred surface remains. Every tuft is a blackened hillock, but few of them are actually destroyed. The razor grass is not killed so easily. It has more lives than a cat for it can endure both fire and water. When the rains fall and the floods come again it will rise up with renewed strength to fight the battle of life. No matter that myriads of seeds germinate on the new clearing and hide the blackened tufts with a carpet of green. The monarch pushes them aside. He will have no intruders here. Tuft after tuft of serrated leaves rise up in every direction and soon clothe the savannah, smothering everything between them, and making as impenetrable a jungle as at first.

All these wet savannahs however are not equally congenial to the great razor grass. Whether from a stronger

current, a lesser depth of pegass, or a poorer soil, other plants manage to exist where this cannot. Where the depth of water is not great a few shrubs of *Jussiæa nervosa*, *Palicourea crocea*, *Rhynchanthera*, and *Hydrolea spinosa*, are scattered among the sedges, grasses and ferns *(Blechnum serrulatum.)* Here are also clumps of the eta palm which relieve the monotony of the otherwise almost dead level. The struggle for life in such places is not so fierce, but it is nevertheless quite obvious. No single species has come to the front, but a goodly number from several families accommodate themselves to the local conditions. Few plants are so impatient of stagnating water as ferns, yet here the *Blechnum* is quite at home, while the *Rhynchantheras* are equally different from the other *Melastomaceæ*.

Creeks flow from all these savannahs and in many places these are fringed by lines of trees. But unlike those of the forest, these are not tall giants with great canopies of foliage, but straggling dwarfs with gnarled stems and limbs. Like all marsh plants they spread their roots to great distances, and have no proper tap roots. Even the leaves are comparatively few and scattered, and altogether the trees appear sickly and weak. On a closer examination however the naturalist sees how beautifully they are adapted to their surroundings. Sometimes the water rises in these places to a considerable height, and anything like a dense mass of foliage would tend to uproot the tree by its resistance to the flood and its currents. As they are, however, there is very little obstruction and it rarely happens that one is carried away.

Where old trees depend on their stiffness, the younger

ones, the shrubs, grasses and numerous water plants, on the contrary, save themselves by extreme flexibility. Even the sturdy eta *(Mauritia flexuosa)*, whose immense canopy of fan-shaped fronds would offer great resistance to a flood, derives its specific name from this quality, which is most strikingly exemplified in the young state. Then its flexible rush-like stalks and narrow divisions flow as it were with the current and allow the water to pass without doing the slightest injury.

The creeks often open out into broad lagoons and here live those plants which can endure a moderate current and rise from the bottom of deeper water than those of the savannah. Some have most delicate stems and lace-like foliage, appearing too fragile to stand the least current. As a matter of fact they are carried away in great numbers by every flood, but having gained the power of increasing to an unlimited extent from the smallest fragment, they are only diffused the more. The most common of these is the Cabomba *(C. aquatica)*, which together with Utricularias and a species of Anacharis similar to the well-known pest so common in English canals, form beds wherever the current is not too strong and the creek is open to the sunlight. Only in clear water can these delicate plants exist, and in the still lagoons of the savannahs, although the colour of weak coffee, the stream is quite free from suspended matters except during a flood. Looking down from the boat upon a bed of Utricularias with their delicate feathery leaves loaded with white bladders the sight is a very pretty one, while their violet-like flowers above the water grow sometimes so close together as to colour the surface. Then the Cabomba with its flowers like little

butter-cups often gives the effect of a yellow lane for miles.

This last plant shows the transition stage to those which, like the water-lilies, float on the surface. As long as it is under water only delicate feathery foliage is produced, but it develops when on the surface pretty flat shield-like leaves. Here we see similar contrivances to those of trees in the forest and the swamp. As long as they are in water they spread out in every direction like the feathery leaves of the Cabomba, but when in the forest extend to form a thick and almost flat disk. With all their weakness these feathery water plants hold their own, and rarely are two species found growing together. It may be that the tangle occupies the water to the exclusion of everything else, or perhaps all save the one species have been smothered by shutting out the light.

Now we come to a class which does undoubtedly prevent everything from growing but themselves: Whoever has seen an estates' canal covered with Victoria Regia must see that every leaf is fighting for itself after it has smothered all the other water plants. Take for example a newly-cleaned trench where this plant has been growing. At first it is quite free from weeds, but frequently a film of what looks like a reddish scum forms on the surface. This is the Azolla, and is well worthy of attention from its peculiar manner of growth, as well as its extreme prettiness. Then comes the Salvinia, and little later perhaps the silvery green rosettes of *Pistia stratiotes*. By this time a few Victoria leaves are opening and soon one leaf-bud comes up after another, covered with their network of ridges which entangle

small plants and lift them out of the water to dry in the sun, or else push them under as the great trenchers spread themselves. The Victoria however belongs to the bays of the great rivers and the sheltered water below the islands rather than the swamp, which is occupied by one or two species of *Nymphea*. These are queens of the deeper water where the current is not swift. They cover the lagoons with their beautiful leaves and decorate them at night with myriads of star-like flowers. The water rises and falls, but however deep or shallow it may be these plants accommodate themselves to it. Sometimes they lie on the mud with hardly any stalks at all and as the water rises these become elongated to twelve feet or more. Both leaf-stalk and flower stem are perfectly flexible, as are also the leaves, which collapse when the current is strong so as to offer little resistance. Notwithstanding its flexibility it is by no means weak, but on the contrary almost like india-rubber in texture. Although it may be uprooted it is hardly ever torn away. The water-lily does not succeed in raising its leaves above the surface of the water, but the Indian Nelumbium has acquired this faculty, and derives some advantage from it in dry weather. The *Hydrocleis Humboldtii*—that pretty flowering plant with three pale yellow petals, so common in estate's trenches—however, although in habit a miniature water-lily, accommodates itself to circumstances like the Nelumbian by strengthening its flexible leaf-stalks. The leaves stand up out of the water, grow upright instead of flat, collect more sunlight, and are thus able to compete with the next class.

Leaving those plants which root in the bottom of

shallow waters and which necessarily have a limit to their power of elongating, we come to another large class that float on the surface. These properly belong only to still waters, but are equally at home rooting in the mud. In Guiana the beautiful lilac Eichorneas, Limnobium, Pistia, and that unique fern *Ceratopteris thalictroides*, are the most common and best examples. By means of hollow swollen leaf stalks or a spongy thickening of the underside of the leaves, they are enabled to float like green rosettes on the surface, rising and falling, carried here and there, but always at home whatever may be the height of the flood. Except the fern they increase by runners, which spread in every direction and soon cover the whole surface if undisturbed. As long as there is plenty of room each rosette lies down on the water, but when they begin to crowd upon each other the inner leaves become less spongy and thinner, and rise on longer stalks until almost upright above the water. The same result follows a drought, when the plants root in the mud and become very luxuriant. The Ceratopteris differs so much from all others of its family that it is hardly recognizable as a fern. In its early stage it resembles a small lettuce with incised and almost curled leaves, little divided; but in a choked canal or on the mud the leaves grow to a length of two feet and are cut into narrow segments. The spores germinate on the leaf, and when a flood comes and breaks the plant into a thousand fragments almost every one of these is ready to reproduce others wherever the conditions are favourable.

Several small species of floating plants are much weaker than those just mentioned, but they manage to

exist in the smallest ditches and pools where perhaps larger plants could not be carried. The best known are the duckweeds, Azolla and Salvinia. The first are not so common here as in England, being replaced to a great extent by the others, which are much larger in size. These are strictly floating plants, and are popularly looked upon as hardly anything more than scum on the water. They may exist for a time on very damp mud, but have made no arrangements like the others for the struggle annually carried on in the bottom of a canal. On examination they are found to be particularly interesting and exceedingly well-fitted for the conditions under which they live and thrive, and although apparently driven into the background by every flood appear again in their myriads when the water is still. Floating plants are more common in Guiana than those which spread under the water. This is due to the fact that the waters are not very transparent, even when still, and during floods decidedly opaque. In a clear English brook the bottom is often covered with vegetation, while in some deep ponds, charas and other plants live and thrive under water without ever rising to the top. Such a thing is unknown here, as even the intense light of the tropics cannot penetrate far through the brown water. It has followed therefore that everything comes to the surface or grows on it, shutting out the light from the Cabombas and Utricularias whenever there is an opportunity. The influence of light can be easily understood from the entire absence of vegetation where a creek is shaded by a great tree, or by examining the water under a covering of floating plants or water-lilies.

Having taken a glance at water plants in general we may return again to the savannah. The giant razor grass is undoubtedly king wherever he can find suitable conditions and the water is not very deep. Other sedges and grasses however can abide a stronger current from their greater flexibility, and find room in other places. Here they have to contend with another monster, that, although not so bloodthirsty as the razor grass, carries everything before him. This is the *Panicum elephantipes*—the floating island grass—which is as much at home in the swamp as on the river. Whatever the depth of water it matters not to him—such things only concern the puny creatures which he permits to exist here and there. Provided with thick hollow floating rhizomes he anchors himself to a bush or in the shallows and will cover acres in a month or two. Spreading out like a great blanket he smothers everything that comes in the way, even going so far as to form something like a dam across a creek, which proves a formidable obstacle and raises the water several feet. Of course this interference does not last long. As well try to keep back the tide as a Guiana flood. The rains come, the waters rise, lift the grassy blanket and tear it to pieces, rush through their proper channel, and the monster is defeated. But he is scotched, not killed. From his fragments others are produced which go on covering their acres of savannah until the flood comes again and leaves them as before.

In the swamp proper where man leaves nature to herself, the struggle has resulted in every plant accommodating itself to some particular conditions. Under these conditions they flourish and increase wonderfully, making

the most of all the variations in depth of water and strength of current. Some do best in a flood, others in a drought, one class only in still water and another in running streams. Few however can withstand a strong current, yet the species of Lacis thrive only among the great boulders which form rapids in the larger rivers. Even the strongest plants can only hold their own under favourable conditions, but the weaker are often most tenacious of life. On the most barren soil where hardly anything beyond pure water can be obtained some of the more delicate plants are at home, and live in peace from the very fact that there is not sufficient food for smotherers.

There are a few wet savannahs where the soil under water is nothing but pipe-clay or sand. Here the sedges are few, thin-stemmed and low, and many a little floral gem peeps through what looks from a distance like the sward of a park. Like the other savannahs however it it is far from level, every clump of wiry sedge rising from its hummock, with a little moat all round it. On the sides of these elevations the tiny rosettes of sundews and utricularias sit and enjoy life without hindrance. Ground orchids, Sauvagesias, Xyrids, and a number of other flowering plants are also scattered here and there, giving the field an air of peace and tranquillity entirely wanting among the razor grasses.

For one water plant to fight with another seems quite natural, but when climbing plants, that ought to raise themselves high in air, begin to run over the water, we are inclined to look upon them as intruders. For a convolvulus to overreach another plant is common enough, some of them being notorious smotherers. After taking

advantage of trees and shrubs for ages, one of them has gone to the water and done very well. This is the *Ipomœa acetosifolia*. Having developed a hollow stem and given up its twining habit, it now runs over the water to great distances, taking advantage of the floating plants for support. That it is not a water plant may be easily seen, as neither leaves nor flowers float but are raised well above the surface. As it does not overshadow the water to any very great extent, however, it is not such a pest to other plants as some of its cousins.

But of all developments in water plants perhaps the most curious is *Neptunia oleracea*. Belonging to the family of sensitive mimosas it looks one of the least likely to belong to the swamp. Yet it has developed a spongy stem which runs along the surface of the water and enables it to cover large areas with its delicate leaves and yellow flower-balls. As in the case of the convolvulus neither leaves nor flowers touch the water, but the wavy stems like whip snakes lying on the surface support these easily.

Anything like the fringe of willow herbs and loose-strifes which decorate the banks of English rivers, is entirely wanting in Guiana. Here bushes come down to the shore and extend into the water, leaving no room for smaller plants, while in the savannahs there is no line of demarcation between river and swamp. Another class of plants like the arrow-heads and water plantains of Europe is but sparsely represented here by a few Sagittarias and Crinums. The bulrush appears to be naturalised on the coast, flourishing in brackish pools and in the trenches alongside the Demerara Railway. In the last places their cylindrical masses of flowers and

seeds remind us of similar pools in England, where school-boys often went to cut "black puddings" as they were called. There seems to be no specific difference between our plant and the well-known *Typha angustifolia* of Europe.

The native plant which takes the place of the bulrush is the Mocca-mocca, *Montrichardia arborescens*. This monster arum fringes the banks of the rivers beyond the line of bushes, growing in water four to six feet deep often raised by tide or flood until twice that depth. With stems like great clubs with the thick end downwards, they endure the strongest current, and by growing thickly together help to preserve the river banks from washing away by flood or tide.

Among the most interesting examples of plant life in the swamps are the mangrove and courida trees. These however live and thrive only on the sea shore or banks of great rivers, in salt or brackish water. All along the coast of Guiana the mangrove swamp covers those parts within the tidal influence, and the trees are doing a grand work in reclaiming thousands of acres from the sea. This however is not the end of their existence but every effort is put forth to fight the winds and waves for their own advantage. If land is brought into cultivation as a result of the victory, neither mangrove, nor courida gain anything, but they still go on as they have for ages past. The twenty miles of swamp between the coast and the forest have mainly been reclaimed from the sea by their agency; the work is still in progress and may be watched by any one who takes the trouble. In the savannahs floods come in the wet season, but these are not of long duration or very power-

ful. On the shore however we have a different state of affairs. Spring tides and strong winds continually recur, while now and again a storm or change of current tears away large portions. Under such conditions it is wonderful that anything could hold its own, yet both mangrove and courida do this and more.

Let us see how the mangrove sets to work. Beginning in very babyhood it develops one contrivance after another until every part is ready for the battle of life. To fix up a wharf or pier, nothing better than the pile has been invented, and in this the mangrove was beforehand with man. It does not scatter its seeds carelessly but keeps them hanging from the branches until they have grown large enough to stand alone. There they are, miniature piles of a foot long, club-shaped below to keep them upright, hanging straight downwards until ready to drop. Then they fall, and penetrate the soft mud below, and are soon able to strengthen themselves by rootlets on every side. Now the leaves begin to open, and as the young tree grows upwards, flying buttresses are thrown out until they form a sort of cage like the structure which supports a beacon. Unlike the forest trees, which rise to such a great height, it commences to spread out immediately above the water, every branch throwing down its crutch and anchoring in the mud. There is no great trunk to obstruct the flow of the water, no tall stem with a canopy of foliage to give play to the wind, but a confused assemblage of small props which allow the waves to circulate between, and a low mass of branches that a hurricane could hardly disturb.

Nature teaches that there is more than one right way

to attain the same end. The courida when contrasted with the mangrove is a grand example of this. Living under similar conditions these two have taken distinct paths. Rarely does the courida develop anything like flying buttresses, but here and there a puny aerial root finds its way from the lowest branches down into the mud. Like useless encumbrances these are often undeveloped and withered. Here is a much taller tree than the mangrove, but instead of being stiff and unyielding like its neighbour, it is to a certain extent flexible. It takes care however not to have a dense canopy of foliage; like those of the Lombardy poplar, its narrow leaves offer little resistance. It would be impossible to overturn the mangrove, but the courida could not stand an hour without some contrivance for an anchorage. It has overcome the difficulty in a most curious manner. Walking between the trees you come upon thousands of short prongs or blunt spikes, all pointing upright from a dense mat of roots extending in every direction. At first sight you wonder what is the meaning of these, but look a little closer and bits of grass, twigs, and other things entangled in them hint that they are here for a purpose. Further along you come to a space where a layer of silt almost covers them and shows unmistakably that they collect mud and sand and help to keep the roots at anchor. Carefully scrape everything above and below and something like a double harrow is disclosed. Prong-like roots descend into the mud and hold down a mat of fibres while finger-like spikes above collect material to cover it. Engineers make similar contrivances by driving small piles and interlacing them with fascines,

but these rot quickly and are not to be compared with the living sea defence of the courida.

Within the memory of many inhabitants of this colony, and under the observation of a few, the work of the courida has been well exemplified. In the charts of the beginning of this century, on the east of the island of Leguan is a shoal called the Leguan Bank, and marked as "hard sand and dry at low water." Now there is a fair-sized island covered with trees at the same place, the result of forty years work of the courida, aided by circumstances.

About the year 1862 an estates' schooner named the *Dauntless* was wrecked on the Leguan Bank and gradually broken up by the waves. A year later a few seeds began to germinate on the slight elevation covering the hull, on which also some members of the Pilot Service threw a number of courida seeds and other floating debris. When once the young plants gained headway they began to spread, every year taking over more and more until now the *Dauntless* Island is an accomplished fact, only requiring to be empoldered to become habitable. In forty years it has grown until it is about two miles long by one broad and continually increasing in size, perhaps to join the island of Leguan at some future period. The work of the courida has undoubtedly been made possible by the help of currents, but until the wreck provided a nucleus for the growth of the tree the same shallow had existed for an indefinite period without the slightest sign of becoming more than the Leguan sand-bank.

All along the coast of Guiana these trees are always at work, with the general result that more land is con-

tinually reclaimed from the sea. True, now and again, a change of current undoes the work of many years, yet although one spot may suffer, the coast line is extending farther and farther, as it must have been doing since ages ago when the sand reefs formed the first beach.

Almost as interesting as Dauntless Island is the Courabanna point, well-known as a land-mark on the East Coast in the last century. It appears that the Courabanna Creek drained the East Coast between the Demerara and Mahaica before any plantations existed in that district. When the estates began to be empoldered, however, the creek became of less importance, the current getting weaker and the bar more and more shallow, until courida seeds found a congenial spot on which to germinate. Then a long island extended itself in front of the creek, entirely choking its old outlet, leaving it to find a way into the sea by the small channels between the island and the mainland. At this time writers mentioned two creeks, the Great and Little Courabanna, the larger channel flowing to the West and the smaller to the East. Soon the lesser became choked and the Creek was then represented as taking an abrupt turn to the left behind a headland called Courabanna Point or Point Spirit. An area of at least a dozen square miles was thus recovered from the sea, mainly by the work of the courida. Later the creek entirely disappeared. The currents have now become changed, and a struggle is taking place at the same spot (Lusignan Point) between the sea and the courida, with the result that a large portion of the reclaimed land has been washed away. Notwithstanding this, however, there will certainly be some gain of land in

the end either here or elsewhere, which may become valuable at a future period.

This is a fair example of what has been going on for ages. Without the courida, banks of sand and mud would probably have been formed, but nothing like the rich soil of the coast, nor perhaps half its area. What happens when the courida is removed is so well-known to every planter that they are not likely to run the risk of interfering with nature's handiwork.

To comprehend the forces at work in the swamp would require careful observation for many years in connection with tides, currents and rainfall. The influence of empoldering is no doubt considerable, but the plants were at work long before man interfered and what we see to-day is mainly the result of their labours. With the examples of Dauntless Island and Courabanna Point before us it is quite easy to understand how our muddy shores have been formed, and how by choking the outlets, the dense mat of courida in front helps to keep up the swamp. Before any plantations existed many small creeks drained the coast and lower reaches of the rivers, and it may be confidently stated that the water in the swamp hardly ever rose to the height now reached in almost every rainy season. Somehow or other the rainfall nearly always kept the creeks full enough to prevent silting up, and if this ever took place a new outlet was soon formed. With every plantation stopping the way however, these natural outlets have been closed, at times with most serious results. After all in sea defences as in many other things a great deal can be learnt by observing nature's methods of doing her work.

Gold in British Guiana, its History and Prospects.

"Guiana whose great city Geryon's sons
Call El Dorado."

By Hope Hunter.

IT has been well observed that as the world grows older the gifts of nature are held in higher esteem, and nowhere could we find an apter illustration of this truth than in the increasing attention now being given to the Gold-fields of the Guianas. In the palmy days of slave-grown produce, a beneficent nature showered riches upon the colonist with a prodigal hand which left him but little to be desired, and no care or anxiety in life beyond the determination of that particular variety of tropical production which might most readily realise the wealth which was the object of his desires. Coffee for a time shared its domain with cotton, but later both had to retire from the field before the advance of the all-powerful King Sugar, which till within the present decade ruled supreme, the autocrat of industries. In the days when TROLLOPE described the government of the country as "a mild despotism tempered by sugar," or more recently still, when Mr. PALGRAVE writing of the sister colony, savagely asseverated "the first man who brings in the news of remunerative gold-fields ought to have from the colony a rope for his reward, and if it silences his voice before he has time to make his discovery public so much the better," it would have needed the courage of an Ajax to have raised the impious question whether the lands of Guiana could have

been created for any other purpose than the aggrandisement of sugar, but "the whirligig of time brings about its revenges," and we see a once mighty industry fast tottering to its fall. If not at the present day, yet a few years more and we are likely to find from one end of the seaboard to the other—the only cultivated portion of Guiana—in places where the cheerful, if unpicturesque signs of industry and prosperity, in the form of towering factory chimneys, were to be seen formerly, dotting the landscape from point to point, the familiar landsmarks have either disappeared, or are seen rising desolate and neglected from fields fast lapsing into wilderness, amid surroundings rapidly succumbing to the rush of rank impetuous vegetation which sweeps like a deluge over the land directly the fostering care of man is withdrawn; while perhaps the eye of the wondering traveller is arrested by the spectacle of some aggressive wild fig-tree waving jubilantly from the summit of some lofty but fast mouldering pile of masonry, as if vindicating the vital force of tropical vegetation, and the triumph of nature over the perishable monuments of human industry.

A great philosopher has observed that we can control nature only by obeying her laws, and second only to nature itself in obduracy is circumstance, that unspiritual god; and the enquiry suggests itself how far the decadence of the sugar industry could have been foreseen and obviated. The whole question appears to turn upon the cost of production of which the prime factor is labour. It is evident that the production of sugar in Guiana for many years past has only been maintained by the aid of extensive introductions of Asiatic labour. Immigration which implies a permanent addition to the agricultural

population of a country is above criticism, and affords a very fair index to its prosperity, but the system adopted in Guiana was an anomalous one. I shall not discuss the question here, beyond hinting that the tradition of Mahommed and the mountain might have furnished a suggestion, but the importation of agricultural labourers from the other side of the world, from the confines of far Cathay and the borders of the Indus, at an enormous expense, and burdened with the obligation of carrying them back again after a limited period, together with all their accumulated wealth—by no means an inconsiderable amount—leaving the country so much the poorer by what they carry away, seems hardly to be the true solution of the problem. Be that as it may, the battle of labour was bravely fought, and victory for a time seemed assured, but viewing the position of the colony from a standpoint beyond the narrow circle of local interests it may be doubted if it was not purchased too dearly. The victory of Bannockburn threw Scotland behind two centuries in civilisation and enlightenment, and if sugar had gone to the wall thirty years ago, and the interest at that period partially aroused in our mineral resources been allowed to take root, to be followed by the development of our gold-fields on a scale commensurate with their importance, who can say what might have been the status of Guiana to-day? We cannot tell, but hardly that of a bankrupt colony living upon appearances. Sugar in British Guiana has had its day. Never again can the old order of things be restored; nor should it be desired. The country which fosters one particular form of industry to the exclusion of all others cannot be held to be truly prosperous, and if the future progress and welfare of the

country are to be furthered, the situation must be recognised and the difficulties manfully encountered.

It may not be generally known that our gold industry sprung up at a somewhat momentous crisis, that following upon the retrenchments and general curtailments of expenditure on sugar estates in 1884–5, a season of very acutely felt privation and destitution ensued among the creole population, who, failing to understand the cause of their sufferings, were led to indulge in seditious murmurings, and visions of contemplated riot, to the extent even of holding secret meetings of malcontents for the purpose of organisation and systematic drill.

In connection with the impending abandonment of estates on a large scale in the vicinity of the Capital, there is a view of the question concerning which a note of warning may not be out of place. It has been found in Berbice that the abandonment of sugar estates contiguous to and to windward of the town of New Amsterdam, and the relapse of well drained and cultivated land to its original condition of jungle and swamp, the nursery of miasma and malarial fever, is having a most deleterious effect upon the health of the community. Georgetown may soon be in an analogous position.

Such is the position of Guiana to-day, and if we turn with longing eyes to our mineral resources as opening up a vista of unprecedented prosperity, the object is commendable, as there are certainly not wanting signs of the highest encouragement. But it would be a disparagement of our gold-fields to leave it to be inferred that we turn to them only under the spur of sharp necessity as a pabulum for misfortune. To the adventurous and daring, British Guiana as the undoubted scene

of El Dorado has always possessed a romantic interest which makes it all the stranger that its exploitation has been delayed so long. It is unnecessary to refer in detail to the tradition of an "ideal city of golden palaces, and streets paved with precious stones, which reflected their gorgeous beauty in the translucent waters of the Parima," beyond remarking that the fable belongs to the country south of the Pacaraima mountains in the vicinity of Lake Amucu. "The geological structure of this region" remarks SCHOMBURGK "leaves but little doubt that it was once the bed of an inland lake, which by one of those catastrophes, of which even later times give us examples, broke its barriers, forcing for its waters a path to the Atlantic. May we not connect with the former existence of this inland sea, the fable of the Lake Parima and the El Dorado? Thousands of years may have elapsed; generations may have been buried and returned to dust; nations who once wandered on its banks may be extinct and even no more in name; still the tradition of the Lake Parima and El Dorado survived those changes of time; transmitted from father to son, its fame was carried across the Atlantic, and kindled the romantic fire of the chivalric RALEIGH."

It was believed by RALEIGH and his contemporaries, that subsequent to the conquest of Peru, the dethroned dynasty of the Incas had founded a new empire to the eastward in Guiana, and although no good grounds for this belief have ever been adduced, a curious coincidence may be pointed out in connection with it. We know that it was the policy of the Incas to rule their subjects with despotic authority, and to impress upon them that all precious metals or stones wherever found belonged

to the royal family exclusively by right, and that to take possession of such was wrong, and would incur punishment, and bring misfortune on the entire race; and it is therefore interesting to find the Indians of British Guiana, whenever met with remote from civilisation, and unsophisticated by contact with explorers or traders, impressed with a singular and superstitious dread of having anything to do with gold, a feeling of which they cannot explain the origin further than that it has come down to them from their fathers that to take possession of gold, or most of all to reveal its existence to Europeans, is certain to bring upon them direst misfortunes. The Caribs of the Barama and Cuyuni preserve to this day the liveliest recollection of the cruelties inflicted upon them by the early Spaniards, and while exploring parties of African descent are welcomed and hospitably entertained, the appearance of an European at their settlements is regarded with aversion and suspicion. The last Spanish expedition in search of El Dorado took place as late as 1775, and like nearly all the preceding ones resulted in the loss of several hundred lives, one man only, it is said, having survived to return and relate the story of disaster and death. The Dutch appear to have given but little attention to the search for minerals, although a general impression prevailed that gold, silver, copper, etc., existed, and a few isolated attempts at mining were made in different places. There seems to have been a belief that precious stones were to be found in the interior, as it is recorded that NICOLAS HORTSMAN while searching for diamonds and emeralds in the district between the Xurumu and the Rupununi, discovered several mines of rock crystal. In 1769 the

Dutch postholder of Arinda, by order of the Governor of Essequebo, travelled to the Maho in search of these crystal mines. The natives advised him not to cross the river on account of the wicked character of the Indians there who might murder him. He was told there were six or seven hillocks of sand and crystals in that neighbourhood, and the natives offered him specimens of each, but would not allow him to dig in the ground where they were found.

Coming down to recent times, the discovery of gold in Caratal in 1857 excited public feeling in the Colony, and exploring parties were sent out in various directions, one of which on its return reported the discovery of gold in one of the tributaries of the Cuyuni, at no great distance from its confluence with the Massaruni. Little appears to have been done until 1864, when a company was formed for the purpose of exploring the locality and of satisfactorily testing whether mining for gold could be profitably carried on. Machinery was erected, and mining was carried on for a short time, but the timid and vacillating policy of the Imperial Government with respect to the boundary question with the neighbouring country of Venezuela, and the general want of favour with which the enterprise was regarded, ultimately led to operations being entirely suspended. Still more recently the establishment of placer workings in French and Dutch Guiana again aroused interest in the question, and I believe that it is to Mr. HENRI LEDOUX that the credit is due of being the real pioneer of the present flourishing industry. The well-known prospector JULES CAMAN and others in Mr. LEDOUX'S employment inaugurated the industry at Akaiwanna on the Essequebo River, where several pay-

ing placers were established.* Next we find CAMAN disassociated from his former employer, and working the same placers on his own account, and a little later some others on the Puruni River. The possibility of finding gold in paying quantities was now beginning to be demonstrated by the success of several small undertakings, both on the Puruni and the Cuyuni, and finally the sale by JULES CAMAN of a placer on the former river for the sum of $30,000 to the newly formed Essequebo Company, drew general attention to the subject. An Ordinance to make provision for Gold and Silver Mining had been passed in 1880; this was followed by another in 1886, but in 1887 the Legislature, recognising the growing importance of the industry, passed an Ordinance (No. 4 of that year) which repealed both the previous Ordinances, and embodied a new set of regulations under which the Royalty was fixed at 90 cents on each ounce of gold and 4 cents on each ounce of silver. In 1884 the quantity of gold exported was 250 oz.; in 1885, 939 oz.; in 1886, 6,518 oz.; in 1887, 11,906 oz.; in 1888, 14,570 oz., in 1889 28,282 oz.; in 1890 it rose to 62,615 oz.; it reached 101,298 oz. in 1891; while the amount exported for the current year up to the present time is largely in excess of that for the corresponding portion of last year.

The Puruni and Cuyuni were for some years the favorite fields, but in 1888 some attention was again being

* Some doubt seems to exist on this point, as to the pioneer prospector who may be said to have inaugurated the industry. Generally the ascription is made, as above, to Jules Caman, but there seem to be good grounds for believing that D'Amil is equally, if not more, entitled to the honour.—ED.

given to the Essequebo River at a place called Hiawah, some twenty miles above the mouth of the Potaro. Prospecting was pushed to the westward until the headwaters of the tributaries flowing to the Canawarook were reached. Again we find CAMAN coming to the front in being the first to ascend the Canawarook itself, where he was successful in establishing some rich workings. Meanwhile Groete Creek and the Demerara and Barama Rivers had been opened up, but after the first rush had subsided a feeling of disappointment set in with regard to those districts, and they have since been comparatively neglected. In the course of 1889, a successful French creole prospector named STANISLAUS made the discovery of a wonderfully rich deposit of alluvial gold at Cumacka, on the Essequebo, ten miles below the Potaro, and this was followed soon after by the discovery of the marvellous placers of Oumai. In the meantime, it had occurred to Mr. RALPH SMITH, Catechist of the Potaro Mission, that the country lying between the Potaro and the Canawarook might be worth investigating, and acting upon his suggestion the RHODIUS BROTHERS made a start from a point on the former river about 20 miles from its confluence with the Essequebo, the terminus in view being the locations of CAMAN on the Canawarook. In this way, the Potaro field came to be discovered, which has certainly produced more gold than any of the others hitherto, and is likely to yield largely for years to come.

In 1891 the colony was electrified by the reported discovery by the BARNARD Syndicate of a goldfield on the Upper Massaruni River of quite unprecedented richness, and an extensive rush of gold-diggers at once took place

to the locality, but strange to relate, although Mr. BARNARD had undoubtedly secured possession of a large number of immensely valuable claims, the new field was of so inconsiderable extent, that without exception the whole army of prospectors who followed him were unsuccessful in finding a single payable creek, beyond those already taken up. It has been estimated that upwards of eighty thousand dollars were spent in fruitless prospection in this district.

Following close upon this came the rush to the Barima River, which though regarded as highly promising in the first flush of excitement has hardly borne out the character of extraordinary productiveness generally given to it. An explanation of this may be found in the character of the formation. The North-western portion of the colony consists for the most part of slightly undulating country with ridges and detached hills of moderate proportions, except in the vicinity of the Imatâca range, which attains at some points an elevation of close upon 2,000 feet, and appears to consist largely of igneous rocks. There seem grounds for believing that this part of the country is of more recent origin than other portions of the Colony further inland, inasmuch as it appears to have been subjected to a much smaller degree of subærial denudation, while the character of the vegetation seems also to point towards that conclusion. Many of the trees found in the valley of the Barima are identical with those growing on the low lying lands of the seaboard, while the general characteristics of the forests present on the whole a marked difference to those of the interior and presumably older portions of the colony. The nature of the alluvial formations also favours this supposition. There is no

evidence of any general and widespread distribution of gold-bearing drift, due to the breaking up of quartz veins and their enclosing rocks, as is to be observed in other places; such auriferous deposits as we find are apparently derived from the local decomposition and erosion of veins *in situ*. This would account for the patchy and irregular character of the deposits, as they are evidently formed only in the vicinity of existing quartz veins, and this may be considered as conclusive of their origin when it is found that in many of the streams the bottom layer of drift contains no gold, the metal being confined to the upper portion and the surface, proving that the deposition of the gold has been a very recent occurrence, and is still going on. While this militates against the district as a field for alluvial workings, it yet points the strongest argument in favour of its being a promising one for quartz-mining, and the very common occurrence of rich gold-bearing quartz in the wash-dirt tends strongly to confirm this opinion. The preceding remarks apply equally to the Demerara and the Upper Massaruni Rivers, where similar conditions are very noticeable.

The rocks of the North-west belong mainly to the metamorphic series, and consist of quartzites, various schists, talc, chlorite etc., in association with gneiss, penetrated in parts by intrusive igneous rocks, and it may be remarked that in the best paying districts granite is never very far off.

Over this district there is a marked want of conformity with most of the other gold-fields, in the absence of a peculiar formation usually described as composed of hydrated oxide of iron, which in the form of massive

beds covers immense tracts in many parts of the colony. The valleys and ravines with the slopes of the hill-ranges over large areas are covered with this deposit, while it forms plateaux and hills of considerable extent, and it may be interesting to compare this substance with similar formations found in other countries. In the gold regions of Brazil is found an auriferous superficial deposit of broken fragments of ferruginous rocks cemented together and called tapanhoa-canga. This canga is composed of fragments of micaceous iron, specular iron, and magnetic oxide of iron, held together by a red, yellow, or brown ochreous cement. The cement becomes in places so abundant that the embedded pieces are not visible, this then forms distinct deposits of red ironstone. It is sometimes richly auriferous in itself, but its chief interest consists in its generally overlying the jacutinga formation, which in Brazil is the most important repository of gold. The jacutinga, so called because of the resemblance of its colour to the plumage of the Brazilian bird *Penelope jacutinga*, is simply a pulverulent variety of itabirite, a rock composed of micaceous specular iron-ore, and a little oxide of iron, and manganese, with quartz disseminated, and usually carrying free gold. It may be noted *en passant* that the mountains in the southern part of British Guiana are composed largely of itabirite. The canga of Brazil is not only found in the valleys and on the slopes of the mountains, but it covers their most elevated ridges and flanks like a sort of mantle, three to ten feet in thickness. The derivation of this conglomerate has never been satisfactorily determined by geologists, some have held an opinion that it was of plutonic origin, while others, pro-

bably more correctly, attribute it to the action of glaciers in a former ice age.

In Venezuela the name *mocco de hierro* is given to a highly ferruginous rock which assumes the various forms of

a. Ferruginous conglomerate
b. Ferruginous grit
c. Ferruginous breccia
d. Pisolitic brown iron-ore.

It always consists mainly of limonite and earthy red hæmatite, with pebbles or angular and sub-angular fragments of quartz, schist and felstone. When it takes the form of pisolitic brown iron-ore, it consists of a number of globular concretions of limonite. This mocco is found in loose blocks on the surface, and often forms plateaux of great extent which are generally marked by a bold rocky escarpment. This formation though frequently auriferous is not considered to afford evidence of quartz lodes in its immediate vicinity, as it is probably of alluvial origin and the quartz mines are generally situated at some little distance from it. In some cases the mocco is of undoubted alluvial origin, and the miners finding that when they met with a bed of mocco they usually had a good pay-dirt, came to the conclusion that the mocco was a good indication of gold deposits. The mocco has occasionally furnished nuggets covered with a black coating of oxide of iron, but while it is not uniformly payably auriferous in itself, it is probable that in many instances it may be found to overlie a pay-dirt or deposit of alluvial gold, and observations made on the similar formation in this colony appear to point to the same conclusion.

In the Cuyuni and Puruni districts we find pretty much the same series of rocks as occur on the Barima and Barama, though it may be remarked that the quartzites are less noticeable, while the unstratified rocks rise into greater prominence, hinting at a more advanced stage of denudation.

The gold-field of the Upper Massaruni possesses distinctive features of its own, and may be described as situated on a nearly circular basis of granite which has risen up through felsite, and is accompanied on the side where the placers are found by eruptions of intrusive diorite.

In the Essequebo and Potaro fields, the latter of which includes the Canawarook district, we find a somewhat different formation. The country rock is very generally granite, or quartz-porphyry through which very extensive igneous eruptions have broken. On the Potaro the igneous agency is very evident, the porphyry being everywhere intersected by extensive dykes and masses of diorite. Although fragments of highly auriferous quartz are occasionally met with in the alluvium of the creeks, it seems probable that the search for quartz lodes in this locality is likely to be attended with more difficulty than in other parts of the colony. It appears to me that the original source of the alluvial gold in the Potaro field is to be referred to the order of formation known as "contact deposits" rather than to area fissure veins, but even acknowledging the latter mode of occurrence, there is evidence sufficient to justify the inference that the majority of the auriferous veins, together with the rocks which enclosed them, have at some remote period been violently broken up, and scattered over the

surface of the land, probably by the action of the waves at the date when the sea covered the whole face of the country up to the sandstone escarpment. It is true that the downward extension of these veins may still exist, but covered up as they are by an immense amount of drifted matter, the task of unearthing them becomes one of much difficulty.

The general obstacles in the way of exploration consequent upon the quantity of detrital matter covering the surface of the land and effectively concealing any outcrop of strata, can only be appreciated when met face to face. Perhaps the most serious drawback in prospecting a tropical country is to be found in the dense forest which covers the entire surface, completely hiding its contour, and rendering it impossible to make out its geology except by the painfully slow process of examining it step by step in detail. Snow might be supposed to be the worst obstacle to geological exploration, but it is by no means so serious a disadvantage as dense forest.

Although not to be exclusively relied upon, the knowledge to be acquired of the geology of a country from its general contour and physical features is far from being inconsiderable. "The form of organised beings" remarks HUMBOLDT "varies according to the climate, and it is that extreme variety which renders the study of the geography of plants and animals so attractive; but rocks more ancient perhaps than the causes which have produced the difference of the climate on the globe, are the same in both hemispheres. The porphyries containing vitreous felspar and hornblende, the phonolite, the greenstone, the amygdaloids and the ba-

salt, have forms almost as invariable as simple crystallized substances. In the Canary Islands and in the mountains of Auvergne, in Bohemia, in Mexico, and on the banks of the Ganges, the formation of trap is indicated by a symmetrical disposition of the mountains, by truncated cones, sometimes insulated, sometimes grouped, and by elevated plains both extremities of which are crowned by a conical rising." In striking contrast are the moderate heights and gently swelling eminences of the older Palæozoic rocks, which give rise by denudation to the rounded outlines which miners are accustomed to attribute to metalliferous districts generally. A closer examination reveals that "blunt cones with craters indicate volcanoes, a series of peaks like a saw denotes dolomites, rounded heads like the tops of nails characterise calcareous rocks, triangular points slates or quartziferous schists, needles crystalline schists, capricious twistings and crumplings serpentines and trachytes, pyramidal forms phonolites, etc., thin and dark looking walls intimate the presence of basalts, trachytes or traps. Rocks broken up by the weather into rounded masses are granites or grits or more rarely traps."

It would be beyond the scope of this paper to refer in detail to the physical aspects of nature in the interior; it is sufficient to remark that the mountain scenery is magnificent in the extreme, and the following description conveys but a faint idea of its surpassing beauty. "This beautiful park of nature is quite surrounded by lofty hills all arrayed in superbest garb of trees; some are in the form of pyramids, others like sugar-loaves, towering one above the other, some rounded off, and others as though they had lost their apex. Here two hills rise up in spiral

summits, and the wooded line of communication betwixt them sinks so gradually that it forms a crescent; and there the ridges of others resemble the waves of an agitated sea. Beyond these appear others, and others past them; and others still further on, till they can scarcely be distinguished from the clouds."

It is to be remarked that there is a degree of resemblance between the geological formations of British Guiana and those of the auriferous districts in Nova Scotia, and it has been suggested that much of the auriferous drift of that country has been swept by recent denuding action into the sea and now forms the submarine banks off the coast. There are the strongest grounds for believing that the tertiary formations which exist on so extensive a scale in the valleys of the Berbice and Corentyne, and in the region of the Grand Savanna will be found to include vast repositories of alluvial gold. No examination has yet been made of those deposits, with the exception of some spasmodic attempts at prospecting on the Berbice, but at points comparatively low down on that river, I have observed great beds of drift of immense thickness, which apparently contain gold sufficient to warrant their being compared with the great hydraulic placers of California. I have already quoted SCHOMBURGK'S opinion of the former existence of an inland sea in that part of the country now occupied by the great savanna, and speaking of the Berbice he remarks: " this ridge of hills which is connected with the Twasiuki and Pacaraima mountains, I am disposed to consider as the old boundary of the Atlantic. Further north commence the hillocks of sand which may be presumed as the consequence of a retiring sea, the ridges as well as

the sides of the hills being covered with angular and rounded quartz pebbles similar to those I had seen previously at the savanna of the Pacaraima." "Ocean placers" are of considerable importance in New Zealand and in California and Oregon—old sea beaches containing the auriferous black sand existing at distances of 50 miles from the coast line, and often at considerable elevations, and in such a position as to show that their elevation must have been very gradual.

The gold obtained from the placers of this colony is of all degrees of fineness, from flour-gold which floats on water, to nuggets of many pounds in weight. The largest nugget obtained hitherto, was found last year at Canawarook by the LUCKIE Syndicate, and when sold in London it realized the sum of one thousand and sixty-seven pounds. As might be expected from the various conditions under which the metal occurs, the gold from different fields varies slightly in quality, the preponderance of rocks of basic composition in Potaro leading to its gold having a rather large proportion of silver in alloy.

With regard to the yield of gold from the placers, I shall quote an authoritative statement from the Official Report of the Commissioner of Mines. "From several of the best paying placers the yield is equal to 1,000 ounces per month, and returning a clear income to the fortunate proprietors of forty thousand pounds per annum. Compared with other gold producing countries, the richness of our alluvial workings shows very favourably, as the following statistics indicate. The average yield of all alluvial wash-dirt, excluding cement, raised in Victoria to the end of 1887 was 1 dwt., 11 grains per ton, on an output of 13,392,842 tons." In British Guiana no

one dreams of washing drift which contains less than 7 dwts. to the ton. From the hydraulic workings of California we obtain the following. "In Nevada County, 16,000,000 cubic yards of drift gave gold equal to 30 cents per cubic yard. In Placer County 43,000,000 cubic yards gave 6 cents, and in Yuba County 25,000,000 cubic yards, gave 25 cents per cubic yard. The average yield of the Smartsville gravel is stated by WHITNEY at about 23 cents per cubic yard." Now the miner's pan contains 400 cubic inches, and as the wooden batea in use here is about the same size, its capacity may be taken at about the $\frac{1}{100}$ part of a cubic yard, and as in our poorest workings, one batea of wash-dirt seldom produces less than 2 grains weight of gold, and frequently up to 2 dwts. or more, a simple calculation will show that the value of our gold drift varies from $8, up to $200 per cubic yard, a degree of richness which makes the estimate of the Commissioner of Mines appear a singularly moderate one, and which taken in connection with the fact that in Australia each spademan is supposed to excavate six cubic yards of gravel per day, points, in the strongest manner possible, the Commissioner's strictures on the rude and inefficient manner of working generally exhibited in the colony. However marvellous may be the advances made in the natural sciences, and industrial arts in modern times, the art of gold-mining must be held to be an exception, as, if PLINY is to be believed, works were carried out in his day in Spain on a scale so stupendous that the gigantic operations of the hydraulic miners of California appear to be but a feeble reflex of them. How far behind the times British Guiana is, may be learned from the report of the Commissioner of Mines,

where he attributes the flourishing condition of the gold industry to the prolific richness of the diggings rather than to the intelligence or enterprise of those interested in it, while every one conversant with the manner in which gold business is too generally conducted must admit that his animadversions on the "child-like simplicity and folly" of local capitalists are only too well-deserved.

As in all other new gold countries, the alluvial deposits are here receiving the first attention, on account of the facility in working, and the ready yield obtained from them, but some laudable attempts at quartz mining have already been made. The Demerara Gold Association conducted somewhat extensive explorations on the Cuyuni, Curiebrong and Essequebo Rivers, but hardly with the degree of success which its efforts as the pioneer of quartz mining deserved. The error committed by this Company appears to have consisted in too precipitately entering upon expensive development work upon lodes which proved ultimately to be disappointing. If a portion of the large amount thus sunk in unproductive work had been applied in the first instance to a general and systematic prospection of the country, productive lodes might have been discovered whose development would doubtless have led to all that the shareholders could have desired. Very satisfactory progress however is being made by two firms, Messrs. FARNUM & CO. and Messrs. WINTER & CO., who are on the point of starting quartz-milling on the Demerara River, where the prospects of successful quartz-mining are of a highly promising character; while it is understood that similar operations are likely to be carried into effect at an early date by others on the Barima.

In the search for metallic veins, it might be supposed that a knowledge of their origin might be useful, but while we possess a general acquaintance with their modes of occurrence, much uncertainty prevails as to the causes which have produced them. While some veins are doubtless due to the influence of igneous action, others have as certainly resulted from aqueous agency, while others again may be attributed to the combined action of both causes, while in every instance there has almost certainly been a pronounced manifestation of electrical forces. It is probable that electricity has formed a more important element than is generally suspected, and this may more readily be believed when it is recollected that one of our most imminent geologists was prepared to find the whole series of volcanic phenomena referable to the evolution of heat by electricity in the interior of the earth.

Attention was first directed to the part played by electricity in the formation of metallic veins, by Mr. R. W. FOX and M. BECQUEREL, the latter of whom "imitated nature, and produced by slow electric action, the sulphides of silver, copper, lead and tin in the most perfect and beautiful crystalline forms," and in recent years a good deal of attention has been given to the subject. The result of investigations in Australia tends to prove that while electric currents have evidently been concerned in the formation of many auriferous veins, the same agency also exerts a powerful influence upon the distribution of gold in the alluvial drifts, many of the phenomena in connection with such deposits being incomprehensible on any known action of chemical or mechanical agencies, but perfectly explainable if referred

to the deposition of gold by thermo-electric earth-currents from aqueous solution. This hypothesis is supported by abundance of evidence which need not be repeated here. It was a common belief with old miners that gold grew like a plant, and that many placers admitted of being worked again and again, a sufficient interval being allowed between the operations for the gold to accumulate.

Prof. EGLISTON of the New York School of Mines who investigated this subject remarks, "the same conditions which cause the solution of gold in certain cases cause also the solution of silica. This explains the phenomenon of mammillary and apparently waterworn nuggets encased in quartz, while both the gold and quartz have been formed posterior to the blue gravel. Many of the causes which produce the precipitation of the gold would also produce the reduction of soluble sulphates to insoluble sulphides, the gold being retained in the mass. This would account for the almost constant presence of gold in pyrites, or the occurrence of some of the copper-ores of Texas in the form of trees, the ore containing both gold and silver; also for the constant presence of gold in the iron-ores of Brazil, the so-called jacutinga, and for the presence of trees transformed into iron-ore carrying gold in some of our Western States."

It is not uncommon in the colony when a large tree is overturned in the course of working to find a number of small nuggets adhering to its roots, a position which points clearly to their having been deposited from solution. The composition of the large nugget referred to as having been sold for more than £1,000, and the

position in which it was found, alike point to the same conclusion. The existence of gold in solution in the waters of our drifts being thus established, it is supposed that its deposition, or precipitation in metallic form, is strongly influenced by the passage of thermo-electric earth-currents, probably generated by the unequal heating of the surface of the earth by the sun's rays in passing from East to West. As is to be expected in a tropical country, earth-currents are very pronounced on our gold-fields, and experiments I have made point to the same conclusion as that arrived at in Australia, namely, that "there is a remarkable relation between the conductivity of the adjacent rock country and the richness of an alluvial drift." As aids in prospecting several electrical appliances have been introduced, consisting mainly of modifications of the induction balance and the telephone and other more simple apparatus, but their practical utility has not yet been generally recognised; still if the theory of earth currents be proved to be of general application it may open up a wide field for their useful employment.

Although the discovery by SONSTADT of nearly a grain of gold to the ton in sea water is comparatively a recent occurrence, the fact of gold being brought up by the waters of terraneous springs appears to have been well-known in very early times. KTESIAS describing a fountain of this kind in India states that every year the gold was dragged up in a hundred earthen amphora at the bottom of which, when broken up, the gold was found hardened. In some of the Western States of America there exist thermal springs whose waters flowing out through fissures produced by subterranean forces are

found to be depositing a siliceous veinstone containing sulphides of iron, copper, oxide of manganese and metallic gold at the present day. At the celebrated Mount Morgan mine in Queensland, the auriferous deposit has probably been the result of a geyser, the gold being contained in a siliceous sinter. In some parts the matrix is aluminous, in others ironstone predominates.

In this colony also we find mountains of iron-ore, one of the best known of which is composed of material similar to the auriferous ore of Mount Morgan—quartz and limonite. Whether it contains gold enough to render its extraction profitable can only be determined by a proper assay, but gold undoubtedly exists, a placer having even been worked for some time in the alluvium at the base of the mountain. As interesting examples of what is believed to have been the deposition of gold from aqueous solution on the most extensive scale, may be cited the Witwatersrand gold-fields of the Transvaal, which in recent years have yielded such extraordinary quantities of gold. Some specimens which I have seen of the auriferous Banket or "almond rock," as the conglomerate in which the gold occurs is called, did not strike me as differing in appearance from many of the conglomerates of British Guiana which extend in an unbroken series across the whole breadth of the colony. I have tested these for gold on the Upper Massaruni, Potaro, Essequebo, Demerara and Berbice rivers, and never failed to find them more or less auriferous wherever examined.

While considering the development and prospects of our gold industry, it may not be out of place to touch briefly upon the possibilities of other mineral industries, indications of which are by no means few nor far between.

There are grounds for believing that diamond mining may become in the future an important industry in British Guiana. It is a comparatively common occurrence to find diamonds in the gravels of our placers, and about two years ago some excitement was created by the discovery of the gem on a somewhat extensive scale on the Upper Massaruni. Upwards of eight hundred gems were obtained in a short time, and although they were all of small size and of little value as ornamental stones, the discovery is important as shewing the possibility of valuable diamond fields existing.

Nothing is known with certainty as to the origin or formation of the diamond in nature, although the experiments of Mr. HANNAY of Glasgow in producing crystallised carbon artificially, favour the general idea that it has resulted from the slow decomposition of certain gaseous hydrocarbons; but the fact is clearly established however that it is to be sought for chiefly in very recent formations. Sir R. BURTON after a careful study of the Brazilian fields was led to form the opinion that the diamond is evidently "younger at times than the formation of gold, and possibly is still forming and with capacity for growth," a conclusion which derives support from the position in which it is so often found in the arenaceous and alluvial matters, such as strata of iron-shot sand and clay that accompany the tertiary and quarternary epochs. The celebrated traveller JOHN MAWE states that the substances accompanying diamonds and considered good indications of them are bright bean-like iron-ore, a slaty flint like substance approaching Lydian stone of fine texture, black oxide of iron in great quantities, rounded bits of blue quartz, yellow crystals etc.

The following extracts from Professor HART'S "Journey in Brazil" are suggestive:—"The diamonds of the Chapada Diamantina come from a conglomerate and sandstone which appears to be a tertiary rock. I do not believe that the diamond ever occurs in the real Palæozoic itacolumite in Brazil, but that it is derived from the tertiary sandstones." He observes further "I am disposed to regard the Chapadas of Erere as the outliers of the great tertiary sheet which covered the great Brazilian plateau, and now lies unbroken over such an immense extent in the province of Matto Grosso. According to the observations of Dr. R. P. STEVENS and others, the plateau of Guiana is covered by an extension of the same great sheet." In confirmation of this latter statement we find Mr. BARRINGTON BROWN remarking in his work on the Amazon that the mountains of Erere and Maxira etc., are composed of beds of whitish sandstone identical with that of British Guiana. The Canga of Diamantina consists of a conglomerate of quartz mica, and other components pasted together with red and yellow iron-clay and covered with the dark ferruginous shining metallic coat which gives to it a name. ESCHWEGE was inclined to consider itabirite as being occasionally the matrix of the diamond.

Thus it will be seen that there is nothing in the minerological composition, or geological age of a large proportion of the rocks forming the surface of this colony, to militate against the opinion that they are in many respects identical with the diamondiferous series in other parts of the world, and may be sufficiently productive of diamonds to make systematic mining for them a profitable industry.

Turning now to the discovery of diamonds on the Massaruni River, we find the locality in question distinguished by a formation somewhat different from the ordinary gold drift. BURTON describes the material of the San Joao mine as a hardened paste of clay, whose regular and level stratification argues it to have been deposited in shallow water. The eastern side is the more ferruginous formation, on the West it is mixed with beds of white sand. Below one foot of brown soil, the argillaceous matter has the usual staining and marbling, glaring-white like fuller's earth with felspar and kaolin, or of different tints from organic matter, oxides of iron, copper, manganese, etc. The diamondiferous soil of the Massaruni may be described in similar terms; it consists of a peculiar fat-white clay composed of kaolin or decomposed felspar, overlaid with the gem-bearing gravel of fragments of variously coloured quartz, rock crystals, white sapphires, and other crystalline minerals. Over a large portion of the Upper Massaruni Valley, there occur extensive beds of recent gravel and sand, touching whose origin the theory of Mr. HILLHOUSE may be of interest. Remarking that the smooth expanse of water above the fallen rocks at Teboco cataract presents the appearance of a lake, rather than of a river, he observes that, "if at a more or less remote epoch the horizontal stratum of granite at Teboco had been perfectly compact and unbroken, the water must have stood at least fifty feet above the present level, and there would thus have been formed an immense lake 10 or 12 miles broad, and 1,500 to 2,000 miles long." The characteristics of the level land between the river and the base of the sandstone mountains are very suggestive

of its having formed the bed of a lake at no very remote period. That the tradition of the Lake Parima was not destitute of some foundation in fact may be taken as beyond dispute, and over very wide areas in the interior of the colony we find traces of great changes having taken place in tertiary times, the replacements of water by land, and alterations in the river systems.

In all the countries in the world where diamonds occur, they are accompanied by certain constants in nature, and in British Guiana such mineral associates as pebbles of blue and yellow quartz, jasper, cornelian, agates, Lydian stone, rock crystals, garnets, platinum, iron-ores, etc., are specially abundant. The South African diamond fields have been described as consisting on the surface of shales and sandstones, which represent old deposits of mud and sand now hardened and altered, but originally thrown down as sediment in a vast fresh water lake. In some of the East Indian fields the diamondiferous gravels are interbedded with marl, in which are found certain molluscs still existing in the neighbouring ocean. The object of these remarks is to direct attention to the probability of diamonds existing in our great drift beds which lie between the base of the mountains of the interior and the alluvial lands of the sea coast. They are set down in the geological map of the colony as composed of sand and clay, but have only been very slightly examined in part, although SCHOMBURGK commented on the similar occurrence of marl and suggested the possibility of their containing valuable deposits. In one instance with which I am acquainted, a diamond of considerable size and value was discovered in this formation, under rather peculiar conditions. It was found embedded in a limy

chalky grit, a sort of calcareous tufa, or concretionary limestone, a mode of occurrence very common in South Africa, and in some of the Indian fields. I have not visited the spot where it was obtained, but I have seen specimens of some of the rocks from that part of the country, which consisted of the above-mentioned substance, shale, sandstone, fine sandy conglomerate, blackened and scorified as if by the injection of molten matter such as BURTON describes, with pebbles of varied composition, while the loose sandy matter was identical in appearance with a specimen of diamondiferous sand from California exhibited in the Museum in Georgetown. Taken in connexion with the comparatively frequent discovery of diamonds in our placers, the subject is worthy of investigation, and legislation having already been provided for diamond mining, there appears to be a fair field open for the investment of capital.

Several early writers on the colony have alluded to the existence in the interior of pebbles of singular colour and formation, and special mention has been made of certain hard lustrous crystals known as Marowini diamonds, but I am not aware what particular mineral was thus designated. Graphite, it may be mentioned, which is closely allied to the diamond in composition though its origin is probably not the same, is abundant on the Barima and the Massaruni, but it is doubtful if it is of sufficient purity to be of economic importance. Sapphires, as already stated, have been found associated with diamonds, and I have seen some small specimens of the amethyst; while jasper, agates and rose and opalaceous quartz which could be used for jewellery, are abundant. It is not improbable that the opal may also exist, and in the

Canuku gneiss region garnets are to be had for the picking up. While on the subject of crystalline minerals it may be observed that gold sometimes occurs crystallized in eight or twelve-sided regular figures, passing into cubes, and in the event of such crystals being found it is worth knowing that they possess a value, as mineral specimens, far beyond that of the gold which they may contain. It is also found in dendritic or tree-like encrustations—a specimen which I obtained on one occasion resembling a small fern leaf in shape.

Although the Government has taken time by the forelock in fixing a royalty on silver mined in the colony, there is no likelihood of any extensive revenue being derived from the source immediately. Silver ores however exist. An attempt at silver mining was made on the Cuyuni by the Dutch as long ago as 1721. Copper is also said to have been found on the Cuyuni, and I have met with copper pyrites on the Essequebo. On the latter river an earlier writer states that there was a kind of metal so soft that it could be cut like lead. An old Indian has informed me that in the locality indicated, the natives were accustomed at one time to collect gold to barter with the early Dutch traders. The geological formation of this placer is identical with that of one of our richest gold-fields, and gold more or less certainly exists in the neighbourhood. As an illustration of the "tide in the affairs of men," it was the writer's experience to predict the finding of gold at Oumai a full year before the location of the first placer there, but a train of circumstances prevented his turning his observations to account.

The new Gold Mining Regulations which came into

force a few months ago excited a good deal of disapproval in the colony, and a vigorous but unsuccessful protest was made by the miners against their enactment, but it is significant that no attempt has been made to explain away the charge upon which the Commissioner of Mines based the necessity for a change. In his Official Report he asserts that in many instances the term working would be a misnomer if intended as a description of the operations in hand—system and method being often entirely wanting—and that a reduction in the size of the claims is essential to their being worked in an efficient and systematic manner to the advantage of all concerned. It is to be admitted that the argument is a forcible one and in the majority of instances well founded.

It is a curious anomaly that in no other description of business in the colony, agricultural or commercial, do we find important positions of trust held by the class of persons in whose hands the great bulk of the practical management and direction of our gold industry lies: a circumstance which, taken together with the Gold Commissioner's encomium on the general probity and integrity of our creole population, would make it appear harsh to view with too severe an eye an occasional instance of a successful prospector being laid under an imputation by his enriched but ungrateful partners of having "picked up an unconsidered trifle" of $30,000 or so more than his legitimate share. *Audi alteram partem:* BRUTUS was an honourable man, and we know what CÆSAR'S wife should be: but is it quite *comme il faut* to have the lucky but illiterate gold-digger boast of tenders of services as bankers from members of Society whose motto should be *noblesse oblige?*

As bearing upon the labour question which is so intimately allied with the welfare of the colony, a slight digression may be pardonable. Destiny it has been said shapes our ends rough-hew them how we will—a great truth; yet there is even more profound significance in the aphorism that character is fate, while again character is influenced by heredity.

The Demerara Medical Association recently interested itself in the excessive infant mortality prevailing among the creole population of the colony, but no learned or lengthy disquisitions were necessary on such a subject, because by any one thoroughly acquainted with the habits of the class in question, the whole subject could be briefly and comprehensively summed up as originating in the cause which led to the adoption of the Salique law, as popularly defined in SHAKESPEARE'S 'King Henry Fifth.' Slavery has been abolished for more than fifty years, but the peculiar usages of a former condition of society are only too slowly dying out, and the black man possessing little originality but being above every thing mimetic, will always be found to be a reflex more or less in manners and morals of those to whom he has been accustomed by traditional usage to look up.

A well founded objection to the new Mining Laws is the omission of the former regulation which gave exclusive right of possession to the makers of new paths or tracks through the forest for three months after completion. As the law stands now, a prospector is powerless to prevent his footsteps being dogged by unscrupulous parties, who avail themselves of his paths and other conveniences without contributing a cent towards the expense of making them, and in the event of his striking

a new field, he is liable to find it over-run by a crowd of followers who may appropriate all the best claims before he has an opportunity of reaping any adequate reward from his labours. It may be contended that such a contingency is met by the regulation which provides that the discoverer of a new field shall be entitled to locate two placer claims before any other person shall locate any therein, but no practical miner will admit that the concession is anything but a delusive one, and for sufficiently obvious reasons the whole clause may be written off as a dead letter.

As instancing the remunerative character of our surface workings, the Commissioner of Mines observes that "an income of $2,000 per annum may be easily obtained by the working of a single tom upon a claim giving a return of one ounce per day by the investment of a capital of six hundred dollars." This is by no means an exaggeration, as it is well-known that some of our very richest placers were established by an even smaller outlay, but the statement must not be taken as implying a general rule, as he elsewhere states that "scarcely anything in the line of legitimate prospecting as is done in other countries, or combination of interests, has ever been even attempted, the success of any enterprise being purely a matter of chance and not a certainty as it otherwise could and should be."

Enough has been said to shew the prolific richness of our mineral fields of which it is no exaggeration to affirm that not the one-thousandth part has ever been explored, and that given proper precautions they present an opening for the profitable investments of capital unexcelled by any country in the world

The peculiar climatic conditions of our colony must however be kept in mind, as they really present by far the most formidable obstacles to the development of the gold industry. It may be stated at once and decisively that Europeans are not fitted to perform heavy manual labour in our goldfields, therefore the Australian system of small independent parties working on their individual behalf is not likely to be successful. The actual physical work of digging the ground must be effected by hired creole labour, which necessitates some capital to begin with, and in connexion with this view the reduction of the size of the claims must necessarily be regarded by capitalists as disadvantageous compared with the conditions under the old regulations. At the same time any ordinarily light description of work can be safely undertaken by natives of temperate climates, such as cutting paths, clearing under-bush, attending sluices and the like, while there is no particular hardship in carrying a load of fifty pounds on a day's march.

A mistaken idea is very prevalent as to the unhealthiness of the interior. I have never experienced any difficulty in maintaining my labourers in health with ordinary precautions, and considering that as a rule only the healthiest and most robust men engage themselves as labourers, the death-rate in the fields should be merely a nominal one. It is true there have been instances of white men succumbing to illness in the gold bush, but as it is supposable that many of those persons were broken in constitution as well as in fortune before they went there, such a result however regrettable was only to be expected. In an experience of five years, I have been sick only twice, and on both occasions I attributed

my illness to the effects of over-exertion and peculiarity of food, rather than to any climatic influence.

It appears to me that the charms of a prospector's life in this colony must be utterly unknown or misunderstood by most persons, else we should find many more enthusiastic and adventurous spirits engaging in it. The admirer of nature, the ardent sportsman, and the lovers of natural history, can each and all find the amplest scope for gratifying their natural tastes. Many of the scenes in the interior, in their solitary loveliness, are beautiful as fairyland, and no one can travel on the Upper Massaruni or Essequebo, but must feel how applicable are the lines,

> "The river nobly foams and flows,
> The charm of this enchanted ground,
> And all its thousand turns disclose
> Some fresher beauty varying round,"

And though we may possess no

> "Peasant girls with deep blue eyes
> And hands that offer early flowers,"

to complete the picture, yet nevertheless it is worthy the description of an earthly paradise. Whoever exults to feel his pulse thrill with some

> "Vague emotion of delight
> In gazing up an Alpine height"

may indulge his passion to satiety amid the mountains and precipices, the romantic gorges, and majestic water-falls of Guiana. How powerfully to the imagination appeals cloud-robed Roraima, the Indians' "ever fruitful mother of waters—" that imposing and mysterious pile, whose precipitous walls frowning through the twilight of antiquity across the waves of a forgotten sea, were long believed to isolate within their inaccessible fastnesses surviving

members of the fauna of the primeval world. How rich in suggestive associations are Sororieng or the "Swallow's Nest;" Taquari or the "Water Jar," for whose tutelary genius the wandering Indian still preserves a lingering reverential awe; the magnificent natural pyramid Ataraipu or the "Devil's Rock;" or that singular basaltic pillar which so closely resembles a stricken monarch of the forest that the beholder involuntarily looks for its fallen crown on the ground beneath, ere he realises that he is gazing upon a column of stone.

The enthusiastic angler may travel to the rivers of Norway or the lakes of Canada, but he will not find better sport, or one hundredth part of the variety of fishes which our waters afford. From a host of others which take the lure freely may be singled out the delicious pacu, which the Indian disdains to angle for, but shoots with the arrow as it darts like a flash of light through the foaming waters of the cataracts. Then there is that fish which HUMBOLDT and others describe, and which might almost be thought fabulous if it were not really one of our commonest, which at certain seasons leaves the ponds which are drying up and travels over the dry land in search of others, which builds a floating nest of leaves and grass, and whose parental solicitude is taken advantage of by the wily creole to effect its capture by exciting it to leap from the water into his hands held ready to seize it. We have also the gymnotus, which, if the fisherman is minded to try the experiment, will intimate to him the instant of its taking the hook by a powerful discharge of electricity from its own body.

Of feathered game there is immense variety: the

powis, the size of a large turkey; the maroodie, which almost any morning may be found roosting in the trees above the traveller's camp-fire, the odour of the smoke forming a powerful attraction; the warracabra, or trumpeter, which if taken young will become domesticated and follow one about and manifest even greater fidelity and attachment than a dog; the maam, the duraquara, and others too numerous to mention. Wild ducks are extremely plentiful in some places, and in connection with them a novel element of sport, sometimes crops up. I have seen when a duck was winged and dropped in the water, a dozen hungry alligators rush in an instant to the surface, and engage in an exciting chase after the wounded bird, and all the alertness of the sportsman sometimes failed to prevent them carrying off the booty before his eyes.

The tapir, the deer, the wild hog, the labba, the acouri, and many other varieties of ground game abound all over the interior and furnish welcome supplies of fresh food, while in some parts jaguars, or tigers as they are locally called, are particularly numerous. These sometimes grow to a considerable size, and are really formidable creatures, occasionally playing havoc on cattle farms. As a rule they are shy of man, although on one occasion on the Potaro, I had much satisfaction in dealing out prompt retributive justice to a daring individual which snatched up a favourite dog almost at my feet. At another time while walking through the forest in advance of my men, one of whom was occasionally emitting a blast from a horn which he carried, a large jaguar, suddenly aroused by the terrific sound, dashed precipitately amongst them, scattering them like chaff in

every direction, but whether the tiger or the men exhibited the greater consternation at the encounter it would be difficult to say. In unfrequented districts it is amusing sometimes to witness the antics of the monkeys, which have apparently never beheld human beings before, as they descend to the lowest branches of the trees and run out to their extremities in the attempt to peer into your face as you pass by. One species a large black spider-monkey is decidedly aggressive however, as it takes a malicious delight in hurling down dry limbs on the head of the unsuspecting traveller, and I have more than once spent *un mauvais quart d'heure* in dodging the shower of dry sticks which came rattling about my ears from overhead.

The dangers of the cataracts on the rivers are generally much exaggerated; as a rule, with ordinary precautions, shooting the falls is only an exhilarating sport, something like, but more exciting than, tobogganing; and this brief description may be summed up by saying that to the lover of novelty and adventure, the interior of Guiana presents advantages unexcelled by any other country, while in addition to the attractions enumerated, there is always the prospective store of red gold ingots to stimulate flagging enthusiasm when other allurements fail.

A good deal of interest has been excited during the last year or two in the question of "Opening up the Country," but so far without much practical result, and an impartial observer cannot but be struck by the reflection that many of the arguments advanced in favour of the various and conflicting schemes proposed are worthy of having emanated from the immortal PETER BELL.

"Who had as much imagination
As a pint pot, who never could
Fancy another situation
From which to dart his contemplation,
But that wherein he stood."

In the first place, each party advocates that particular scheme which best furthers his own immediate interests, without regard to the general requirements of the colony in the future; and with this object, the difficulty of access to the gold-fields is ridiculously over-estimated and exaggerated. The navigation of our rivers—even those most impeded by rapids—by bateaux is an immeasurable superior mode of travel compared with the snail-like progress of the bullock waggon in new countries, where even the rudiments of roads do not exist, as was the case in the early days of gold-digging in Australia, South Africa and elsewhere; and this senseless outcry is calculated to deter the very thing which the colony at the present time stands most imperatively in need of: the introduction of capital from outside. Compare the easy and uneventful six days' journey to the Potaro with the conditions of travel indicated in the following passages from a well-known writer who took upon himself a mission to describe the early gold-fields of Australia from personal observation. "We have been nearly a month on the way, and have only made forty miles out of the seventy-five to the diggings. Those who like us go up with carts carrying their stores with them fare like us. They are continually breaking down, getting stuck fast in deep sloughs and compelled to unload and re-load continually. There have been instances of people being five months in getting up to the diggings with loads."

Arriving at a ferry the following dialogue ensued.

Passenger: I suppose you pay a large rent to Government for this ferry?

Ferryman: The Government! The Government has nothing to do with it; it is my own, I put it up myself.

Passenger: Then I think on your large profits you might afford to make some improvements for the convenience of your passengers, and if you are wise you will reduce your fares or you will some day find the Government stepping in and taking the concern into their own hands.

Ferryman: Ha! ha! ha! the Government indeed! If you wait till Government does anything you may wait till doomsday.

Now our Government is inclined to do something, but the precise manner in which the opening up of the country is to be effected is a very momentous matter considering the vast expense of such an undertaking, and should not be precipitately entered upon without due consideration of every aspect of the question and the absolute requirements of the country. It may be recollected that a few years back it was proposed to construct a road from the lower Massaruni to the Mara-Mara Creek on the Puruni, and a considerable sum of money was expended in making a preliminary survey of the proposed route. This scheme, from which so much was expected, was after a short time quietly relegated to the limbo of forgotten projects, and now reposes peacefully in merited oblivion: this was but four years ago, yet I venture to predict that in four years more the at present much talked of scheme of the Bartica-Essequebo railway to the head of the falls, whether accomplished or not, will be

regarded with a similar sense of humiliation at its short-sightedness and fatuity. If money is to be spent let it be laid out upon some comprehensive project which will be of permanent value in the future instead of a time-serving scheme which can only promote limited local interests which may cease to exist before the means of furthering them can be carried into effect. If no more goldfields remain to be discovered, then no railways are needed, but if the whole country be more or less payably auriferous, and no one acquainted with the gold formation of the colony can doubt that this is so, then the sooner this fact is established the better, as we shall then possess reliable data upon which to base calculations. The colony and its natural advantages must be made known as widely as possible, and when this is followed by a great influx of capital, the gold industry will make a prodigious stride, and the paramount necessity of opening up the country being clearly demonstrated the means of effecting it may be safely and unhesitatingly determined.

Although the signs of the times seemingly point to gold as the harbinger of better days, I am far from attributing paramount importance to it as being the only likely source of prosperity in the future: I am disposed to regard it rather as a means to an end. There are hundreds of young men now in the colony—and they would be followed by thousands from elsewhere as soon as their example became known—who, could they only realise a little capital by gold-digging, would gladly settle down and engage in some permanent occupation of an agricultural or industrial character, thus forming at once comfortable homes for themselves, and the be-

ginning of a new era of prosperity of a kind hitherto unknown in the country. Science, as we all know, must claim its martyrs; and modern progress, even in the peaceful arts, is somewhat of a JUGGERNAUTH car, else we should scarcely find the boon of cheap bread—so beneficent a blessing to the poor of Europe—causing the patrician West Indian to weep for the cheapness of sugar. There was a time when the Continental farmers found wheat no longer profitable, but they did not bewail fate or traduce the American producers who caused the drop in prices; they set themselves to establish a new industry, and if their success has operated prejudicially towards us we have at least similar resources open to us. It may be asked whence is the labour to be derived to effect so desirable an end? When we find the West Indian newspapers of the day advocating the wholesale emigration of the African population from the Islands as the readiest means of bestirring themselves, it is clear I think, that the labour question may safely be left to take care of itself. A recent issue of the *Bulletin* says:—"Every day the conviction deepens that the best thing for Barbados and the best thing for themselves is for large numbers of people to emigrate to the Congo or to British Honduras, or anywhere they can improve their condition and rise in the world." With regard to the recent proposal to establish an Agricultural College in this Colony, which has been so decidedly negatived in some quarters, no more unjust or unmerited aspersion has ever been cast upon a class than that which represents our creoles as too lazy and indifferent to avail themselves of the benefits of such an institution. At times innumerable, when paying large sums to gold labourers, I have

asked them what they intended to do with the money, and have advised them to save it until they acquired a small capital which they could invest in some form of agriculture. Their reply has invariably been that they had never been taught or encouraged to cultivate any kind of agricultural produce other than plantains and ordinary ground provisions, for which there was only a limited local demand, and that directly provision growing was taken up in anything like an extensive scale, over-production would ensue, and the industry cease to be profitable. The moral is obvious. The creole may, and too often does, exhibit a certain amount of apathy and indifference in matters of moment affecting the welfare of his country, but perhaps not to a greater degree than is manifested by many of those whom he delights to imitate, in most subjects that are not concerned in the bolstering up of an effete industry. When a public meeting is called to discuss even such a burning question as the opening up of the country, what do we find?—the meeting postponed time after time for want of an audience, and when at last it does come off, the speakers addressing themselves to a "beggarly array of empty benches."

It is gratifying to find the Government at last assuming a definite attitude with respect to the boundary question, a matter which has too long been left in abeyance. The importance of the subject may be gathered from the following statement made nearly twenty years ago, on excellent authority. "It is understood that at one time the feeling of the inhabitants of the Province of Angostura, or Bolivar as it is now called, actually tended towards annexation to British Guiana, and that a

due appreciation of the value of that territory might have led to the removal of the difficulty, and given to British Guiana the possession of the right bank of the magnificent Orinoco as its western delimitation." When we read such confident assertions as, "it may be safely affirmed that had there ever been a real desire on the part of the Imperial Government to have the question definitely settled, abundant opportunities could have been found for so doing" the neglect of such opportunities appears the more regrettable, as English and American capital and labour are largely represented in the mining districts of Venezuela, and recent events have certainly not tended to promote the security of either life or property in that country. It is well-known that the Venezuelans rely greatly upon the friendly feeling of the United States in the matter of their dispute with Great Britain, but how far they have propitiated the people of that country lately may be gathered from recent utterances of prominent American newspapers which condemn the disorder prevailing in Venezuela in unmeasured terms, while deploring the fact of "American citizens being left to the mercies of semi-barbarians."

"So entirely are English countries now the motherlands of energy and adventure throughout the world," remarks the author of 'Greater Britain,' "that no one who has watched what has happened in California, in British Columbia, and on the west coast of New Zealand, can doubt that the discovery of placer gold-fields in any sea-girt country in the world must now be followed by the speedy rise of an English government; were gold for instance found in surface diggings in Japan, Japan would be English in five years." The explorer in British

Guiana has no need to penetrate further than two hundred miles inland for the discovery of new and extensive gold-fields, but if need were to extend research further, the debatable land lying between this colony and the Brazilian possessions in the south, offers a favourable field for exploration. Concerning the whole of that vast region which forms the watershed between the northern Atlantic slope and the lower Maranon, the eminent geologist Sir A. GEIKIE remarked to a friend of the writer in the course of conversation a year or two ago, that absolutely next to nothing was known of it with certainty, and that it presented one of the most interesting scenes for scientific investigation in the whole world. ACUNHA, one of the savants attached to ORELLANA'S second expedition on the Amazon, the French traveller MONTRAVEL and others, speak of the gold washed down by the streams which take their rise in that region, and I have been made acquainted with some particulars of an expedition composed of a party of Americans to that part some years ago. They discovered abundant evidence of the country being rich in precious metals, but the hostility of the Indians, culminating in the massacre of nearly the entire party, prematurely terminated their investigations, the few survivors making their escape with much difficulty. This portion of the South American continent is inhabited by various Indian tribes who are said to still practice cannibalism, and one tribe the Pianoghottos on the confines of British Guiana are well-known for their inveterate hostility to strangers, many instances having been recorded of their having repulsed and murdered boats' crews penetrating to their country from the Brazilian side.

In conclusion, the condition of things in the colony may be briefly summed up as one of transition, the country cannot any longer be adequately described as the sugar-growing community of Demerara: while it has not advanced to the rank of a recognised mineral one; what it may become must be left for him to say who can

> " Dip into the future far as human eye can see
> See the vision of the world and all the wonder yet to be,

but no one I think can doubt that in turning seriously to the development of her mineral resources, British Guiana has taken a definite step towards the accomplishment of her manifest destiny.

Our Trade Relations with the United States.

By the Hon. Arthur Weber.

At the April meeting of the Royal Agricultural and Commercial Society, a detailed paper by Mr. Nevile Lubbock, entitled "Notes on the Washington Mission," was read, giving a summary of the circumstances and conditions under which the Reciprocity Treaty with the United States, was arranged. The thanks of the meeting were accorded to Mr. Lubbock, and the paper incorporated in the minutes of the Society's Proceedings, (*Timehri*, June, 1892 p. 218.) The present article by the Hon. Arthur Weber forms a fitting supplement to these "Notes" contributed by Mr. Lubbock.—Ed.]

A GREAT deal has been lately written on the important subject of our American Trade relations, and the wholesale condemnation which the Reciprocity Treaty with the United States has evoked, as expressed in some of our local papers, demands that the matter should be placed before the public in the proper light. The members of the Combined Court have been asked to secure the abrogation of the Treaty, but before they attempt to do so, they will no doubt look at it in all its bearings, *pro* and *con*, and with that attention which such a matter, all important to the colony, deserves.

The first question with which we are concerned is the right of the United States to induce this colony, or any other colony or country, to give them certain concessions which they think, rightly or wrongly, will favour and develop their own trade; and it would be quite futile to deny to them, either in fact or in principle, such a right. This would be against every principle of the law of

nations. For some reason entirely their own, they have seen fit to embody in the McKinley Tariff Bill, the principle of reciprocity as expressed in Section 3 of that law, which is too well-known to require quoting; and in pursuance of that clause they have called upon us to come to terms with them so that our sugars may be admitted free of duty into their country.

So far then they stand on a perfectly legal basis. Whether their motive is a political or an economic one, it is left for them to decide. They have induced other and larger countries and colonies like Germany, Brazil, Spain and the Spanish colonies, as well as the West India Islands and this colony, into tariff concessions to them for the free admission of the sugars which these countries and colonies produce; and the question remains for us to decide:—are we gaining or losing by our Reciprocity Treaty with the United States?

My answer is that this treaty is a decided benefit to this colony. We have to ask ourselves:

First—Supposing our sugars were not admitted into the United States free of duty and were therefore excluded from that country, what would be the result on the value of our annual sugar crop.

And secondly—Having obtained through our Reciprocity Treaty the free admission of our sugars into the United States, is it at too great a cost in the concessions we have made, or not?

I shall now endeavour to deal with the first question.

If our sugars were excluded by the United States we should necessarily have to seek a market for them elsewhere at such prices as we can obtain for them in that country. Where else can our produce be sold at

the same value? It has been urged that we would find an outlet in Canada and England. This may be the case, but at what a difference in price!

Both the Canadian and the English markets are open to our sugars, and if they at any time offer prices as good or better than any other country, our produce will go there free of all restrictions, and our planters will no doubt at once avail themselves of any such inducements.

But what about Canada? The Dominion's demand for our sugars can hardly be called a factor in our political economy. I think I am right in stating that our entire export thither does not amount to much over one twenty-fifth or less, of our crop (which for the sake of argument I will put down at about 120,000 tons per annum,) or say 5,000 to 6,000 tons. To suppose that by closer trade relations with the Dominion we could increase their demand for our produce is a fallacy. Their tariff acts against the higher class of our sugars, and in any case the northern people would not bid for our yellow crystals at anything likely to compensate us for the loss of the United States markets. The hallucinations about the Canadian market becoming a large customer for our sugars may therefore be abandoned, and on this I may speak with some authority, seeing that my firm has been a shipper thither for a long period, and its members know all that can be known here about that market.

Then comes the question about the English market. I think this might be answered by the mere statement of fact that, in spite of all that has been said in its favour, our planters, who no doubt know best where their advantage lies, continue to make by far the larger portion of their crop for sale in the United States and not

for the English market. If they found it more profitable to make yellow crystals for shipment to England, why do they not do so?

Here I might be met by the question, why did the demand for the United States fall off in the first half of the present year, and lower prices prevail in that country immediately after the passing of the reciprocity arrangements, so that our planters found a better market for their yellow sugars in England? This question is easily disposed of. In the first six months of each year, the Cuban crop is being reaped and sold; this crop amounted in the present year to about eight times that of ours, and when American refiners can supply themselves freely with Cuban and Beet sugars, they naturally see no cause to pay us any more for ours. The Reciprocity Treaty is not supposed to be the panacea for high prices, but enables us to compete on equal terms with other producers.

On the other hand our yellow crystals are quite a speciality in the English market, and to a *limited* extent sell at good prices, say at about the same as the refining crystals. I say they are marketable in limited quantities only, but if shipped in *large* quantities their value quickly recedes.

It so happened that, unfortunately, the crop of the first six months of this year was miserably short, more than 30 per cent below that of the same period of last year. If therefore the exports of that period to England shewed a surplus over that to the United States, it was simply owing to the fact that out of the small total the usual supply could find a better market in England, say 15,000 tons distributed over a period of six months, or

at the rate of 2,500 tons per month. This is probably the maximum of what the English market can take, at a price which the planter finds equal to that which he can obtain for refining crystals in the United States. But how about the balance of the crop, and especially the large quantity which is marketed from the middle of September to the end of December and estimated to reach 65,000 to 70,000 tons? If all of this were to go to England in the shape of yellow crystals, I should like to ask at what sacrifice of price could it be sold? I would name 1/6 per cwt. as the lowest reduction when compared with the price at which the *limited* quantity can be sold. We value the average crop of this colony at about 120,000 tons. A rough estimate of the gain to the colony by reciprocity with the United States would therefore amount to at least $720,000 per annum.

The misfortunes under which our sugar industry has laboured during the first six months of this year, are therefore not attributable to the McKinley Tariff—which in itself is the cause of an enormously increased consumption in the United States—nor to the Reciprocity Treaty with that country, but to the exceptionally bad season and the consequent short crop.

I would point out to the opponents of this treaty that most of our planters continue to avail themselves of it instead of seeking a better market elsewhere. Surely our planters are fully alive to their interest, and will get the last cent a cwt. out of their produce. They evidently find it comparatively more profitable; and I have already stated the figure at which I estimate—I think very moderately—the annual profit to the whole sugar industry of this colony.

I shall now deal with the second question, that of the cost to the colony for the benefits of the Treaty. Having already stated my estimate of the direct gain to the sugar industry to be $720,000 at least, and it being a matter of fact that we pay for these benefits in our Tariff concessions the sum of about £30,000 or $144,000, I need not say that I consider the balance arising from the Reciprocity Treaty with the United States as vastly in our favour.

But do we pay the concessions of $144,000 or thereabouts in hard cash to the United States, or is it merely a shifting of taxation from one source to the other to please the susceptibilities of our American Cousins? In the latter case, according to all the teachings of political economy, we virtually pay nothing at all. If the duties on certain articles of import under our Treaty obligations are reduced, the entire community should proportionately be benefited, and the corresponding burthen on other incidents of Taxation would be borne again by the entire community, so that in theory the deficit on the one hand and the gain on the other would counterbalance. Ergo, to the United States directly we pay nothing for the benefit which the Treaty confers, except in the shape of a larger demand for their particular exports, which, rightly or wrongly, they think may arise from it. For my part I do not expect any but the natural increased demand will arise for their staple exports to this colony, for which we have always looked to them as our natural source of supply. There are some items of manufacture, &c., in which they may interest our colony to a greater extent, but then we are not obliged to import them from the United States, if we can get them cheaper from other sources.

It may be true that in some very isolated cases the Reciprocity Treaty may bear injuriously on individuals, but I should like to hear in what particular, and to what extent, this would affect the colony generally. It may also be contended that the reductions in our Tariff do not affect the consumer. I admit the possibility, or even probability, that the principles of political economy as taught by the great masters of that science, cannot always be applied to the peculiar circumstances of this colony. I remember when certain duties were re-imposed in the year 1888—after a few years of free admission—on certain staple articles of provisions, what arguments were used against the measure,—but what is sauce for the gander, must be sauce for the goose. To make up the revenue sacrificed by the Reciprocity Treaty Obligations, some new incidents of Taxation had to be found, some of which have been objected to. Of course every new tax meets with serious objection from some quarter, and happy is the Government that need not impose them. The planters I think acted wisely in cheerfully submitting to the small imposition of 50 cents per acre on their cultivation, which yields a revenue of about $40,000. Let us consider how this bears on the price of their produce. The acreage in cane cultivation remains about 80,000 acres for the whole colony, which at the average of 1·50 tons per acre yields about 120,000 tons of sugar. Their direct contribution towards the loss of revenue under the Treaty therefore amounts to 33⅓ cents per ton or about 1⅓ cents on every 100 pounds of sugar, which is certainly a small contribution towards a gain of $6 per ton. The additional tonnage dues were not considered with favour by some, especially the ship

owning interest in England, but the result so far shews that the colony has not suffered thereby, inasmuch as sugar freights from the colony to England and the United States have rather declined than advanced since these additional dues came into force. The Stamp and Death Duties have not been popular, but the inhabitants of the colony are gradually getting accustomed to them, and they are a recognised source of revenue in other countries.

It is quite possible that experience will in time shew us whether the incidence of Taxation necessary to make up the Concessions in our Tariff have been placed on the right shoulders. I am sure our Representatives, combined with the Government, will endeavour to modify any burthen that may be found to have been injudiciously imposed. But on the whole I do think there is not much cause for complaint, and frequent changes greatly disturb trade and are therefore not advisable.

Looking at the entire question therefore as far as this colony is concerned, I would respectfully submit that we are greatly benefited by the Treaty of Reciprocity. We still look upon the sugar industry as our mainstay. Its welfare means the prosperity of the entire community, and a great step has been made in securing to our staple free admission in the United States. It is quite possible that even without any Concessions on our part they would not have been proclaimed against, just as at present Java sugars are freely admitted without any treaty obligations. This colony could not afford to run the risk of having the United States markets closed to it, inasmuch as even one year's exclusion under the present condition of the industry, would have been a

blow from which we could only have recovered with great difficulty.

To those therefore who would ruthlessly interfere with the Treaty and see it abrogated, I would address a word of warning, lest they should find out when too late what a serious injury would be done to the great industry and to the inhabitants of the colony.

On the Necessity for Proper Foodstuffs.

By E. D. Rowland, M.B., C.M.

IN my previous papers on Air and Water published in this Journal, it was comparatively easy to show that all the human race used these in definite forms and proportions, but when we come to deal with foodstuffs proper, we find the variation as to quantity, mode of taking, and form in which they are taken somewhat difficult to reduce to order without going into a somewhat deeper examination than is usual in a popular journal. If we take the ultimate analysis of foodstuffs the matter is simplified no doubt, but it presumes some knowledge of organic chemistry. With this knowledge we are able to say that the human body requires to maintain it in health, a definite quantity of carbon, nitrogen and various salts, in the same way as we have seen that it requires a definite quantity of oxygen and water.

The human body is composed of water, oxygen, carbon, nitrogen and various other elements combined in various proportion and ways. We have dealt with the two first of these and it now remains for us to examine the three last named, to note the proportions of each, how they can best be supplied to the body, and sundry other subordinate conditions. Bearing in mind what has already been laid down as to the perpetual change that is going on in the human organism; how the cells are ever-changing; now receiving new particles of matter from the blood, now discharging effete matter; and that this

is carried on sometimes faster, sometimes slower as work is done. Remembering how these never ceasing interchanges are always carried on in a watery medium aided by oxygen, we shall I think be able readily to grasp the principles that are involved in supplying foodstuffs to the body. The necessity for food is demonstrated by the fact that under usual conditions man dies in about 8 to 10 days, if deprived of all ordinary foodstuffs. From time to time fasting men and others have existed for longer periods but this does not invalidate the general rule. Animals deprived of food die when they have lost 40 per cent of their original body weights; they gradually emaciate, the fat going first and the last phenomenon being a considerable fall in the temperature of the body.

Man, from the anatomical structure and arrangement of his teeth and digestive organs, is evidently best fitted to live on a mixed diet, occupying in this matter a position between the carnivora on the one hand and the pure herbivora on the other. We know also from practical experience that a good mixed diet produces the finest races of men—and in this colony the lesson is pointed in the marked improvement to be seen in the physical condition of the creole Coolie, a mixed diet eater, over his father the immigrant Coolie, a rice eater. From careful observation and analysis it has been found that an adult doing moderate work wastes in grammes per day—

Water	2818·
Carbon	201·2
Hydrogen	6·3
Nitrogen	18·8
Oxygen	681·45
Salts	3·2

And it is to supply the daily waste, in order that the body may do work that food is taken. The oxgen and most of the water have as I have stated above been fully studied previously. The hydrogen plays but so small a part in the economy that it does not require any special study here, the body always finding enough of this element in almost any combination of foods forming a diet. The carbon, nitrogen and salts are found combined in various proportions in the animal and vegetable world, from which fact another classification of foods is frequently made. The nitrogenous bodies for the most part belong to the animal kingdom and are generally albumens, the carbons, called mostly carbo-hydrates, to the vegetable kingdom, in the forms of starches and sugars, while salts are found combined both with the albumen and carbo-hydrates. The few other salts used came directly from the mineral world. The fats which form another important element in a good dietary can be obtained from both animals and vegetables, but in the human economy it has been found that a deficiency of fat in a diet can be compensated for by the use of more carbo-hydrates, which are in such cases converted into fats.

It is important to remember that although this classification of foods is correct generally, there is nothing absolute in it for we find that nitrogenous bodies exist in wheat (10 parts nitrogenous to 36 parts non-nitrogenous), in rice (10 parts nitrogenous to 123 parts non-nitrogenous), in plantains 3·75 cent nitrogenous, 96·25 per cent non-nitrogenous), and non-nitrogenous bodies in beef, (10 parts nitrogenous to 17 non-nitrogenous), in milk (10 nitrogenous to 30 non-nitrogenous), and so on

through the long list of substances, animal and vegetable, used by man in the various parts of the globe as food. It is to the wide distribution of these substances combined in so many various ways in such varying proportion in nature that we find such differences in the foods of the people of the earth. These variations are due also in part to the influence of the climate on the individual and on the food produced. It is this to a great extent that allows and necessitates the Greenlander to exist on such a large amount of animal food and fats in a cold country where vegetables are scarce, while in the tropics rice and pulse with a limited amount of animal food is taken. The East Indian lives on rice, the Mahommedan on dates, some of the Eastern Islanders on the sago palm, the Central African on plantains and roots, the Kaffir like a great portion of the inhabitants of the United States and Canada, on maize. The Irish eat potatoes, and the Scotch oatmeal, the Scandinavian rye and wealthier nations live on wheat and meal. In the West Indian Islands I am told the staple articles of food vary in each island, in some like Barbados consisting mostly of sweet potatoes and cornmeal (ground maize), in others cassava, and in others again like ourselves the plantain.

It is laid down by authorities that the food which is best fitted for our bodies is that which contains 1 part of nitrogenous to $3\frac{1}{2}$ or at most $4\frac{1}{2}$ parts of non-nitrogenous matter. Unfortunately in nature there are few substances in which these proportions are found, milk and wheaten flour being the most common and important but too costly for the people, hence various combinations are resorted to by the different people to make

up the deficiency, in which ever direction it may be. As for example when we take starchy puddings made with eggs, milk and butter, fat bacon or sausages with poultry and as when the East Indian mixes the various peas and fats with his rice. But this last race never gets enough nitrogenous food hence his poorly developed muscular system. In British Guiana the deficiency of the plantain in nitrogenous matter should be and is for the most part made good by meat and wheaten flour.

LANDOIS states that by careful analysis it has been found that, as a rule, an adult requires daily 130 grammes proteids (albumen), 84 grammes fat and 404 grammes of carbohydrates, but this quantity is liable to vary with the condition of the person. And PARKE gives the following scale for diets.

	At Rest.	*Ordinary Work.*	*Laborious Work.*
Proteids ...	2·5 ...	4·6	6 to 7
Fats	1·0 ...	3·0	3·5 to 4·5
Carbohydrate ...	12 ...	14·4	16 to 18
Salts	·5 ...	1·0	1·2 to 1·5
Total Water free Solids	16 ...	23	26·7 to 31 ozs.

So that under ordinary conditions the quantity of say 23 ozs. of dry solid food is combined with from 25 to 37 ozs. of water, so that really we daily take about from 48 to 60 ozs. of solid food. Or put in another form in which the weight of the various elements making up each class of food is shown we find that an adult during ordinary work uses—

	Carbon.	*Hydrogen.*	*Nitrogen.*	*Oxygen.*
120 grammes of albumen containing	64·18	8·60	18·88	28·43
90 „ „ fats „ ...	70·22	10·26		9·54
330 „ „ starch „ ...	146·82	20·33		162·85
	281·20	39·17	18·88	200·73

And to this must be added

744·11 grammes of Oxygen used from the Air,
2818 „ of Water.
32 „ of Salts.

Making in all about 7 lbs. of matter consumed in 24 hours.

The various parts of a diet have each a special use not altogether limited to themselves, but overlapping to some extent, as we have noted in the case of a deficiency of fats being supplied from the carbohydrates. The nitrogenous matter supplies the used-up muscles, and allows work to be done, aiding also in the production of heat. The fats and carbohydrates maintain the heat of the body and supply the used up-fats and carbonaceous matters to the tissues. The salts which are found combined in all animal and vegetable tissues play a very important part in the maintenance of health. Even if the small proportion of iron in the human body is not maintained, disease and ill-health result. In good beef no less than 7 grains of salts are found in every ounce and in 100 parts of the ash of beef the following are found :—

Potash	35·94
Magnesia	3·31
Lime	1·73
Potassium	5·34
Chlorine	4·86
Oxide of Iron	·98
Phosphoric Acid	34·36
Sulphuric Acid	3·37
Silica	2·07
Carbonic Acid	8·02

In milk there are found the following :—

Potash	23·46

Soda	96.6
Lime	21·34
Magnesia	2·20
Chloride of Soda	4·74
Oxide of Iron	·47
Phosphoric Acid	38·04
Sulphuric Acid	·05
Silica	·06
Carbonic Acid	2·05

These salts except the iron, which has the special function of helping to carry the oxygen to the tissues, merely maintain their proper proportion in the tissue—merely replacing the daily waste. The common table salt which is used so much is chloride of sodium, and not being found in sufficient quantity in food materials naturally requires to be added to make up the dietary.

In addition to these substances various seasonings, properly called condiments, are used with foods such as peppers, various spices, mustard, curry powders, vinegars, and so on. These have all more or less the power of promoting or aiding the flow of the various digestive fluids and hence are used widely.

Food should be taken at definite times, the same period of the day being highly desirable from the fact of the organs of the body learning to accommodate themselves to alternate intervals of rest and work and being therefore able to perform these functions more satisfactorily. Many suggestions have from time to time been made as to the proper hours for taking food, perhaps the best being the following. A light meal, breakfast, should be taken in the early part of the day. The breakfast in this colony is taken much too late. The

heavy meal could be taken about 3 o'clock or so in the afternoon, and a light meal later on in the evening, but not too near bed time. For those who have much mental work in the later part of the day the heavy meal may with advantage be deferred till the evening, but 8 o'clock p.m., is much too late. In addition to the water, and as supplementing it to a greater or less extent, artificial beverages are made and used by man, the principal being tea, coffee and cocoa. They are useful as being in small doses nerve stimulants and so removing the sense of fatigue after work, When taken hot as they usually are they act with benefit on the skin. Opium and tobacco and some allied substances are eaten or smoked, and though not food are largely used by nearly all the world. Tobacco and opium are perhaps the least harmful of many that are used. The reason for their use is somewhat indefinite, partly no doubt custom influences this matter, but they are all nerve sedatives. Nevertheless we can well affirm that they are not necessary to health, and that if their use is not kept within relatively small limits like alcohol they are positively injurious either mentallv or physically. Alcohol and its use as an article of food will not require much notice here. No doubt it has its uses but it cannot be too strongly asserted that in a condition of health it is not required, that positively nearly all are better without it and that ninety-nine persons out of a hundred who take it in the firm belief that they require it are self-deceived. The diseases produced by errors in foods are many, and can be shortly indicated here as being produced by excess or defect in quantity and quality of the whole or of any part of the die-

tary. Any great defect in the general quantity leads to a general deterioration of body which allows acute communicable disorders for the most part to attack a people, as is so commonly seen in India where famine is always followed by Cholera. Excess of food also produces by repletion an enfeebled state of health and an increased liability to disease. Special disorders are the result of excess or defect in special parts of a dietary, as gout by excess of nitrogenous foods and scurvy by defect of vegetables, more especially green vegetables.

In the matter of food as in all other things of this life moderation should be the guide, but when if ever the time shall be reached when man will allow his reason to govern him in the matter of the food he shall eat and the liquid he shall drink, there are as far as I am aware no dtaa for forming an opinion.

Sugar v. Gold.

LETTER FROM A DEMERARA PLANTER TO HIS PROPRIETOR IN ENGLAND.

YOU have asked me for my views on the sugar prospects of the colony, and I will endeavour to put you in possession of at least some of the facts relating to our position.

You tell me that in the City you hear the sugar industry spoken of as "now tottering to its fall, although mighty in bygone years" and I gather with great regret, that some Demerara proprietors have lost all faith in their sugar properties, their one idea seeming to be to realize if possible, and failing this, to crop and abandon. From your further remarks, it would also appear that complaints direct from the colony are not unknown, that the gold-fields have so seriously affected the labour market, and that this coupled with adverse seasons and low prices, make it now almost impossible to work an estate at a profit.

It is notorious that some estates in the colony continue to yield their owners a yearly profit and that some do not. I should not like to say that all those which lose money could be made to pay, because one may find an estate which from poor land, isolated position and other circumstances, would be better abandoned in the interest of all concerned, but such cases are few, and I am satisfied that many estates which do not pay at present, can be made to pay. It may be presumed that if a man owns a sugar estate, which yields him a revenue in spite of bad years, low markets, foreign

bounties, scarcity of labourers, borers, rats, crab dogs and the gold industry, he is so far satisfied with his property that he never dreams of abandonment. Perhaps however he may desire to sell, fearing similar difficulties in the future to those which he hears beset his neighbours' Plantations. But I ask why should he be dismayed? Where can he get the same interest on his capital, as he can derive from a successfully managed sugar estate in Demerara? The impossible survival of the bogus bounty system in Europe, the still further reducible cost of production, increased extraction from the cane, and new labour saving-machinery in the Factory, all tend most clearly and truly to encourage hope in the hearts of sugar estates proprietors.

The greatest blow given to the sugar industry in late years in this colony, has been the abandonment of Plantation *Bel Air*, but it must not be forgotten that *Bel Air* is a very exceptional estate. It had a very heavy expense in its public road and sea dam. Most estates on the East Coast have about one rood of dam and road to about five acres of land in cane cultivation, then taking the average yield as one and a half tons of sugar to the acre, we have seven and a half tons of sugar burdened with the expense of keeping up one rood of dam and road. The cost of dams and roads varies very much, but on no estate has it been so great as at *Bel Air*, and then the length of the roads and dams at *Bel Air* and the amount of public traffic on them is much greater, as compared with the cultivated area, than on any other estate in the colony. *Bel Air* has had the advantage of an exceptionally good supply of labour and an exceedingly healthy situation, but in spite of these advantages

the owners have not seen their way to continue the working of the estate; still this does not prove that other estates are necessarily in a moribund condition.

The history of gold all the world over is the same, the first effect has always been to paralyze existing industries. When the rush set in in Australia, merchants left their desks and sailors abandoned their ships, but the eventual result was a great stimulus to every enterprise in the colony. The same rule held good in California, and it will hold good here. Gold has taken away much labour from the cane-fields that can be but ill spared, but when it attracts labourers from surrounding countries it will re-pay with interest everything that it is now borrowing from the agricultural industry. It is absurd to suppose that this country will ever cease to depend, mainly, upon agriculture in some form or other, and if sugar be 'tottering to its fall' what is to take its place? The outlook for sugar is not as dreary as is commonly supposed; there is every reason to suppose that the consumption of the world will go on increasing as it has done in the past, and there are good reasons for believing that the increase in the production of beet sugar will not keep pace with this increase in consumption. Where is the further supply of sugar to come from? Obviously from the tropical cane-field. And what country is better enabled to grow sugar than the coast lands of British Guiana.

It is true that the number of sugar estates becomes yearly fewer and fewer, but the export of sugar does not decrease, it fluctuates, as is natural, considering what an important part the weather plays in the matter, but it is a fluctuation with a tendency to rise, just like the suc-

cessive waves of the incoming tide. The decreasing number of estates goes to prove that sugar does not pay on a small scale as well as it does on a large one. This is quite obvious. It costs as much for a man to look after a pan that strikes five tons of sugar as it does for one that strikes ten, and many other things are the same.

There can be no doubt that the profitable production of sugar at the present time is not an easy task, but competition is so keen that the same remark holds good of every business. I have no doubt that the French wine grower and the English farmer would make the very same observation, yet we do not hear that those businesses are 'tottering to their fall' and no one expects that the vineyards of France or the farms of England will be 'given over to weeds'.

That there will always be fluctuations in a business with two such uncertain factors as weather and the state of the markets must be expected. The vision of the fat kine and the lean kine was applicable to agriculture. There are signs that the tide is on the turn and the long years of depression are coming to an end. The returns of the last three months of 1893 are most encouraging. On all sides one hears of large returns from the soil, small expense in the factory, and sugar turned out at a cheap rate.

With regards to the tightness of the labour market owing to gold, there are two things that should not be forgotten. First, it is only one kind of labour that goes to the diggings. It is a very valuable kind and planters regret losing it; but our coolies are left to sugar, and so are the women and boys, and in this country women and boys are very useful members of the labouring classes.

Second, the cure is the importation of more coolies. The country is large enough to support an enormous population. Estates must also be kept up to the mark in every kind of labour-saving machinery, and also in every kind of fuel-saving apparatus, the methods of extraction must be of the best, both as regards the extraction of the juice from the cane and also the produce from the juice, of both sugar and rum. Nothing must be thrown away and wasted. These, coupled with care, economy, watchfulness, and above all with good seasons, will enable the Demerara cane grower to compete with the beet, even though the latter be 'bounty fed.'

The best labour, 'the stalwart negro,' will very likely leave sugar for the more exciting and better paid gold digging; very well, planters will have to do the best they can with the dregs of the labour, and after all the dregs are very good dregs. The coolies are by no means to be despised, and they show no desire to go in for a bush life.

There is a rival to King Sugar, but the old monarch is not dead yet, nor his reign over. Many things might secure him on his throne as firm as ever; a diminution of the beet crop is always possible, whether from weather or war. The abandonment of bounties is not only possible but exceedingly likely. Let us wish every prosperity to gold, there is plenty of room for that and sugar in this country, yes, and tobacco as well, and everything else that can be profitably produced. These will never seriously injure the great staple of the colony, Sugar.

Papers relating to the early History of Barbados and St. Kitts.

Annotated by N. Darnell Davis.

ON the 15th, 17th, 19th and 26th of March and on the 9th of April 1647, a Committee of the House of Commons took the statements of several witnesses in respect to the grievances of the colonists of Barbados, against the proprietary rights claimed by the Earl of Carlisle. The Committee sat in Great Palace Yard, "in Sir ABRAHAM WILLIAMS' house there." Mr. MILES CORBETT, who was afterwards executed as a Regicide, was the Chairman. He is said to have taken down the examinations with his own hand. If these original depositions are in existence they must be searched for in the muniment room of some country house, for the fire of 1834 destroyed the records of the House of Commons. Happily, notes of the several examinations have been preserved in the Bodleian, and in the Library of Trinity College, Dublin. It is from the archives of the latter that the following *Breviat* is taken.

From MSS., G. 4, 15, in the Library of Trinity College, Dublin.

Breviat of the Evidence given in to Committee of the House of Commons by the Petitioners against the Earl of Carlisle's Patent for the Caribee Islands.

FIRST PLANTACION OF BARBADOES.

CAPT. HENRY POWELL saith, that in Anno. 1626, he went to Barbadoes in the shipp *William of London* of

which Sr. WM. CURTEENE was owner, and that this Examinate did set out of England purposely for the Barbadoes to plant there, that he landed forty men there, and then went to Desecubee, from whence he brought two and thirty Indians about 6 months after, and all plants (Indigo excepted) which are nowe upon the Island and saith, that Sr. WM. CURTEENE did send two shipps more the same yeere with neere a 100 men, all English, to plant that plantacion. And further saith, that Sr. WM. CURTEENE and his brother went in Joint Stocke, and that the Chardge of the Voyadge for the shipp was about £8,000*

JAMES ASTREY, justefyeth all to be true that Capt. POWELL hath testifyed, yet saith himself was not there.

* "Sir William Courteen being informed by his correspondents in Zealand that some Dutch men-of-War sent out upon private Commissions against the Spaniards had put into this island and found it uninhabited, and very fit for a plantation, did thereupon at his own charges sett forth two shipps provided with men, ammunition, and arms, and all kinds of necessaries for planting and fortifying the country. Landed and entered into possession of the same in the month of February 1626, and called it the Barbadoes, setting up His Majesty's colours in the first fort that was raised there. And afterwards in the same year sent Captain Powell thither with a further supply of servants and provisions, who in 1627 fetched several Indians from the Main Land, with divers sorts of seeds and roots, and agreed with them to instruct the English in planting Cotton, Tobacco, Indigo, &c."

From *Sloane MS. 2,441, An account of Barbados and the Governments thereof, with a Mapp of ye Island.* Sir Richard Dutton, Governor-in-Chief, 168¾.

Among the *Domestic* State Papers is one, which has thus been calendared by Mr. Noel Sainsbury. (See *Calendar, Colonial*, Vol. 1)—1627, April 5, the Council to Buckingham. Pray and require him to give order that Captain Powell may proceed in his voyage to the West Indies in the *Peter*, notwithstanding the restraint.

JOHN TUCKERMAN, Shipp-carpenter, saith, he hath knowne the Barbadoes 20 or 21 yeeres, and that he went thither in Anno. 36, (when, beinge prompted, he said he was with Capt. HENRY POWELL, and that they were the first people which settled in the Barbadoes), and that there was noe plantacion then or before, to their knowledge nor any people, heathen, or Christian. That they left 30 men all English but 2 or 3 Blackes. That he went in the shipp *Wm. of London,* of which Sr. WM. CURTEENE and Partners were Owners, as this Examinate hath heard, and saith that Sr. WM. paid this Examinate his wages, that they stayed at Barbadoes about a month and then went to the Mayne to Desecubee, from whence they brought provision for the Island, vizt., cassador rootes, pines and potatoes, and alsoe 25 or 26 Indians, men, women and children to worke there; that after they came backe from the Mayne, there came 2 English Shipps with English people to plant there, knowes not whither they were sent from Sr. WM. CURTEENE or not, saith that Capt. POWELL'S brother JOHN was Admirall of those shipps and that they landed two Iron Gunns upon the Island and left them there, and Armes for the rest of the people.

JOHN CLEERE, Boatswaine of Capt. HENRY POWELL'S shipp, afterward with JOHN POWELL saith, that JOHN TUCKERMAN and he went togither to the Barbadoes about 20 or 21 yeeres agoe, and that there was not any people then there nor any ground cleered, but what they cleered themselfes, that they stayed awhile at the Barbadoes, and then left some 30 or 40 men there English, and tenn negroes taken in a prize, and that they went from Barbadoes to Desecubee, and brought thence cassador

rootes, plants, pynes, corne and all provision fit for men, and carryed from thence about thirty men, women and children Indians. And that when they came back to the Barbadoes there came another ship thither, whereof Mr. IRISH was Commander, and this Examinate further saith, that they went out upon Sr. WM. CURTEENES account which this Examinate knowes, for that they went out for my Lord CHAMBERLAINE. Saith that Capt. HENRY POWELL was sent out by his brother. Sr. WM. CURTEENE was part Owner and Victualler and set out the shipp, and afterwards saith, that Sr. WM. CURTEENE was whole and sole Owner, but Capt. POWELL had a parte.

And further saith, that they went downe as a Man-of-Warre, and that both the POWELLS came out of England as men of warre, and went out with letters of Marte *(Sic)*.

NICHOLAS BROUNE saith, that he went Quarter-master to Capt. HENRY POWELL in the shipp *Wm. and John,* neere 20 yeeres agoe this Aprille as he thinketh by his Marriadge and Children, and that the ship was set out by old Sr. WILLIAM CURTEENE, that they were shipped in his name and paid at his house, that they arrived first in the Barbadoes whether they carryed passengers to inhabite, and landed about 40 there, that the Island was not planted nor any people there, heathen or Christian before they came, that they stayed not longe there but went to Aroonoto,* and brought Sugar Canes and all kinde of plants from thence to Barbadoes, and that the shipp *John* came then there, that the *Peter* was pinnace to their shipp, that JOHN POWELL, Capt. POWELL'S Sonne was left Governour there, and that they left two Gunns and a third parte of their provision.

* *Orinoco.*

CAPTAINE THOMAS IRISH saith, that he went out as Captaine in the ship the *South Phenix alias* the *Costly* in Anno 1628, and that there were divers merchants and owners of that shipp, saith that he carryed noe letters from the Earle of Carlile to the Barbadoes, neither was there any nominacion of him there then, that the Barbadoes was planted by Captaine HENRY POWELL, Captaine JOHN POWELL and his Sonne, and that noe men were then at the Barbadoes, but theis and their Company, that Capt. JOHN POWELL was Governour and that this Examinate landed 140 men at the Barbadoes in Anno 1628, 40 whereof belonged to Captaine JAMES FFUTTER and that this Examinate had other people to be landed upon other Islands.

JOHN ACKLAND saith, that he was Boatswaine of IRISH his shipp in Anno 1628 about May or June, and that they went to the Barbadoes and landed about 140 men in the Barbadoes, who did settle under the Govermt. of Captaine JOHN POWELL at the Chardge of Sr. WM CURTEENE, that Captaine JOHN POWELL was then Captaine of the Company there.

FIRST PLANTINGE ST. CHRISTOFERS.

CAPTAINE ROBERT DENNIS saith, that he went to St. Christofers 23 or 24 yeers agoe in January last, in the shipp *Marmaduke* of London, set out by Mr. MERRIFEILD and his partners designed to land men at St. Christofer's and to plant there, that they landed 19 persons besides himselfe who was the first man that landed there, and that then there were noe people upon the Island besides the Indians, but only three ffrench who had bin shippwrecks, and were slaves to the Indians.

JAMES ASTREY saith, that he landed in St. Christo-

fers, out of the shipp the *Marmaduke* in Anno. 1623, beinge set out by Mr. MERRIFEILD with many other Adventurers long before the Earle of CARLILE, his name was heard of, that his name was not heard of eight years after.

MAURICE THOMSON saith, that he hath heard that the first plantinge of St. Christofers was in Anno. 1623. And that in Anno. 1626, this Examinate sent over thither. That himselfe with other merchaunts did send over in company with Sr. THOMAS WARNER 50 or 60 men to plant there, that in Anno. 1627, this Examinate with his partners sent over two shipps more thither, one whereof was called the *Plough,* which upon her settinge forth was stayed at Southampton by warrant from the Lord Treasurer MARBOROWE* on the Earle of Carlile's parte. And that the messenger then informed them that it was the King's pleasure that the Earle of Carlile, should have a patent for the Govermt. of the Islands and desired that they would attend his lordship, they accordingly did attend the said Earle and upon his lardge promise of Libertyes and immunityes did take a patent from his lordship for a thousand acres of Land.

FORTIFICATIONS. BARBADOS.

JOHN TUCKERMAN saith that he knowes not whether Captaine POWELL and his Company made any ffortificacions or not, but saith they landed two Iron Gunns upon the Island and left them there, and that they left them their Armes for the rest of the people musketts, swords and small round shot and powder.

CAPTAINE PETER STRONGE saith, that the forty pound per poll. to my lord and the Governor was pretended to be for a Stocke to ffortefy the Island.

* James Ley, Earl of Marlborough.

THOMAS BASTON saith, that the £20 per poll. to my Lord was reported to be paid for the good of the Island for fortificacions, that about sixteene months, sithence the Island was not fortefyed.

ST. CHRISTOFERS.

CAPTAINE JOHN BROOKHAVEN saith, that about 23 or 24 yeers agoe there were ffortificacions at St. Christofers which he supposed to have bin at the Chardge of the Countrey, by reason there was a tax set for the labour of every tenth man for that purpose, and knowes that there have bin other taxes of Tobacco for fortificacions.

WILLIAM ROPER, Planter in St. Christofers, saith, he went to St. Christofers, 17 or 18 years agoe, and hath lived there almost ever since, and that he came home on 12th day last, and saith that there are foure or five fforts there, which the Planters have built at their owne Chardge, and that it was at the Countryes Chardge, for that their servants threw up the earth; but as for the Gunns that are mounted some 6 or 8 peeces, he knowes not at whose Chardge they were, but that some of them have bin given, and he beleeves the Generall bought some.

LEIUETENANT COLL. WELDINGE saith that my lord CARLILE did send some parte of the Ordinance, and that the Governour got some by shippwracke. But as to the ffortificacions thinkes a 5t. (?) man was daily sent in to that purpose.

Arbitrary Power.

TAXES AND IMPOSICIONS PER POLL.

CAPTAINE PETER STRONGE saith, that he went to the Barbadoes in Anno. 1634 and that in (35) ye Imposicions were first begunn by Captaine HAWLEY, wch. he

first exhorted the people to pay to my lord and himselfe viz^t, 20 lbs. weight of Cotton or Tobacco to my lord, and 20 lbs. weight to himselfe per poll. for men and women, but cannot say for children, and saith it was pretended for a stocke to fortify the Island, to defend it from invasions; that in the yeers 36, 37, 38, 39, 40, 41, it was compulsively exacted by Governour HAWLEY his brother and Sr. HENRY HUNCKS, and that when the tyme of the yeere came that Goods were ripe, the Governours issued forth to every ffamily with arrests upon their Goods not to dispose of them or carry them forth of their houses, till my Lord CARLILE'S and the Governours dutyes were paid.

CAPTAINE JOHN ACKLAND saith, that he hath bin fivee tymes at the Barbadoes and hath severall tymes seene the dutyes at 20 lbs. to my Lord and 20 lbs. to the Governour per poll. paid in by bills to them they call the Governours Receivours: hee hath heard it was paid per poll. for men, women, and children: hath heard alsoe for suckinge children, hath seene it paid per poll, but knowes not howe they numbered the ffamily. And that he hath knowne attachments laid in the Storehowse for this duty, till they had made it appeare that they had paid the duty. Cotton and Tobacco then worth 2d. per pound.

THOMAS BASTON, merchant and Cittizen of London, saith, that he hath bin at the Barbados too and againe theis many yeers, and that there was an attachment out at 20 lbs. per poll. for my lord laid upon goods in his hand.

CAPTAINE JOHN BROOKEHAVEN saith, that he went to St. Christofers in the yeere 1628 in the ship *Carlile*

with one Mr. MOLE and Mr. HAVERCAMPE who came with a Commission from the Earle of Carlile to demaund a fift parte of the people's Labours, whereupon the people were soe distasted that they rose in Armes. That the people ever since paid 40 lbs. weight of Tobacco per poll. and besides a henn per poll. or 20 lb. weight of Tobacco which the Governour said was by donation from the people which they now disclaime.

MR. THOMAS HORNE saith. That he went to St. Christofers the yeere before the Spaniards came thither* and that he staid there 12 yeers, and that the taxes were 20 lbs. of Tobacco to the Earle and 20 lbs. to the Governour and 10 lbs. to the Capt. per poll. and that they were compelled to pay it.

WILLIAM ROPER saith. That all taxes are laid by the Governour and Councell and that they pay 20 lbs. to the Earle, 20 lbs. to the Governour and 10 lbs. to the person per poll. for all above 7 yeers old. That they pay 40 lbs. per poll. besides for the maintenance of five guards for the Island, which is only paid for the men, and not for the woemen and Children. And that those Guards have bin up about five or six yeers, and that besides the 40 lbs. per poll. for maintenance of theis Guards they bought plantacions for provisons for them. And that in the pretinell (?) where the Examinate lived they bought a plantacion for a Garden to maintain the Souldiers which cost 13,000 lbs. of Tobacco through that precinct, and saith that he knows no commaund from the Earle to that purpose. Saith that a henn was paid per poll. for men and women about two yeers agoe for the Governor and that a henn was worth 20 lbs. of

* The Spaniards attacked St. Kitts in 1629.

Tobacco, and if they had not a henn they paid 12 lbs., that the Taxes were imposed by the Governour and Councell, doth beleeve they had noe Assembly till after that, cannot tell whether with Consent of the Assembly or not. That there was noe Assembly but twice as he remembers. The Councell of my lords choseinge and not of the Assemblyes. That in this Examinate's tyme by order of the Generall they paid halfe a pound of Indigo per poll. for powder shott and other Ammunicion for defence of the Island, that they paid it about tenne yeers agoe, and that they paid it in November last, but would pay none sithence.

JAMES BARREY saith, that he hath lived in St. Christofers 17 or 18 yeers, that he went thither in Anno. 1630, and came thence in May last was three yeers. And that at that tyme the 20 lbs. of Tobacco to my lord was duly paid, that there was in ffamily men, women and children per poll., 20 lbs. to the Earle, 20 lbs. to the Governour, 10 lbs. to the Capt. of the division, and 10 lbs. to the munster, *(Sic)* and for two yeeres they paid a henn per poll. or 20 lbs. of Tobacco to the Governour Sr. THOMAS WARNER.

LEIUETENT. COLL. WELDINGE saith, that in Anno 1628, he went over to St. Christofers Agent for MAURICE THOMSON and carryed with him a graunt from the the Earle of Carlile for a 1,000 acres of Land, and that then a fift parte of the planters labours was exacted from them. And that he hath heard some paid at *(Sic)** And that this was generally upon all old and newe planters. And that this Examinate was much pressed and importuned to pay it, but he stood upon priviledge

* ? it.

of his Grant. And saith that MOLE and HAVERCAMPE came with Commission as they pretended from the Earle of Carlile, but knowes not the tyme when they came, saith they laid heavy imposicions in that tyme on the people, and that the people mutyned at that tyme, and that the wheeles of the Ordinance were turned towards the shoare upon the people's dislike of the imposition.

ENFORCEINGE OF TAXES—BARBADOS.

CAPTAINE STRONGE saith, that when the tyme of the yeere came that Goods were ripe, that the Governours warrants directed to the Provost Marshall issued forth to every family with arrest upon their Goods not to dispose of them or carry them forth of their howses till the lord of Carlile's and the Governours dutyes were first paid: saith, he hath seene, goods arrested as men have bin carryinge them downe to the sea, hath seene goods taken away towards and at the sea side, saith he hath heard that their bedds and hammacks have bin distrained for want of Goods to pay their dutyes in Specie, and that he knowes one in towne, that had his hammocke distreyned but knowes not his name: that men have bin threatened for not payinge their duties, but knowes noe Exemtion in that kinde, and further saith that men have bin prohibited and could not depart thence, before they had given security to pay my Lord's dutyes.

CAPTAINE ACKLAND saith. That he hath knowne attachments laid in the Storehouses for dutyes of 40 lbs. per poll. till they made appeare their dutyes were satisfyed.

THOMAS BASTON saith, there was an attachmente out for 20 lbs. per poll. for my Lord laid upon goods in his

hands, and that he hath sould goods for Cotton or Tobacco, and that Cotton or Tobacco was seized in his hand for my lord before this Examinate could be paide.

CAPTAINE BROOKEHAVEN saith, that he knowes not any man hath suffered for non-payment of taxes but knowes in generall their goods have bin taken away, that their potts in which they should have boiled their meats have bin taken away, and Soe they have bin forced to eat their meate rawe.

ST. CHRISTOFERS.

Mr. HORNE saith, that the Marshall demaunds the dutyes at the beginninge of the Crop, and that they are not to shipp any goods or pay any debts till the dutyes are satisfied, that he hath seene warrants at the tyme to distrayne, if they had not pay when they came for it.

WILLIAM ROPER saith, he knowes not any imprisonments or corporall punishment on any man's servants taken away for non-payment of the dutyes, but saith, that the lands have bin seized for the dutyes, and yt. if another man had bought the land they would demaund the dutyes of him three or foure yeers after, and that none came off without payinge their dutyes.

JAMES BARREY saith, that in case of refusall of taxes, their servants have bin taken away, and that this Examinats owne Servant was taken by the Generall Receivors for his dutyes, not my lords, and that thereupon he went and paid his money, and had his servant restored. Knowes noe other servant taken away, saith that they used to distrayne others servants and goods, knowes noe corporall punishment on any for non-payment of Taxes.

Restraint from Plantinge of Tobacco and the Taxes Enforced.

ST. CHRISTOFERS.

Mr. THOMAS HORNE saith, there was a Cessacion from plantinge of Tobacco for two yeers, and that those who did not plant Cotton then to pay the dutyes were forced to pay them out of the next crop.

WILLIAM ROPER saith, that about 13 or 14 yeers agoe, there was one yeers restrainte from plantinge of Tobacco, and about seaven yeers agoe, another restraint for two yeers togither, the first yeers restraint was by consent of the Generall Assembly of the Countrey, and the second yeers was made by the Governours and Councells, the first restrainte was made for the advanceinge the price of the Commoditye, and Soe alsoe the Second, but yet paid dutyes for those yeers.

ALIENATION.

CAPT. STRONGE saith, that in the yeere 1639 and (40) there was a Court set up, called the Alienacion Courte, and that noe man could sell or alienate, but he must take a newe patent, and pay 10 lbs. of Cotton or Tobacco for every acre, whereupon the people complayned, they were to pay this upon penalty of looseinge their Lands as he hath heard, but knowes noe such thinge. That there was a fee to be paid to the Clerke of the Office, knowes not how much, but to the best of his Remembrance thinkes it to be 25 lbs. of Cotton, and that there was so much required of this Examinat this last voyadge for the same business, knowes none who paid for alienacion, but that he hath seene Bills for Cotten for ffines. That BOOTON conveyed his lands to this Examinate for satisfaccion of the preiudice he had

by his Cotten, and that there was 40 lbs. weight demaunded of this Examinate for that voyadge, was thereupon restrayned 12 hours from off the Island, was afterwards released, passinge his worde, that if there were such a due, he would pay it.

FEES OF COURTS—BARBADOS.

CAPTAINE STRONGE saith. That the ffees of the Clarke of the Alienacion Office was 25th lbs. weight of Cotten.

ST. CHRISTOFERS.

WILLIAM ROPER saith, that the ffees for tryall of accions are very greate.

In the Same Examinacion complaynes of patent duties, and being asked what theis patent duties were, saith they are a pigge, or a Turkey or the like for a fine or a lease or such a thinge.

OTHER ARBITRARY TAXES AT BARBADOS AND ST. CHRISTOFERS.

JOSEPH JORDEN saith, that in the yeere 1635, they did set rates on his goods, and when they had them ashore they made him sell at what rates they pleased, that in the yeere 1638 this Examinate came from Barbados to St. Christofers, and Captaine POWELL would not let him have any water there untill he had paid a barrell of powder, and that thereupon this Examinate was forced to give him bond for 50 lbs. of Tobacco as he remembers.

FINES—BARBADOS.

CAPTAINE STRONGE saith, that one WILLIAM BOLTON was fined for takeinge good Cotten out of this Examinats bagge, and puttinge in bad, and that the said BOLTON caused his servant to owne the Cheate and gave his

freedome for it, and that afterwards it beinge knowne that it was BOLTON'S act, he was fined for it.

THOMAS BASTON saith, that Capt. FFUTTER was fined 40,000 lbs. of Cotton.

OATHES—BARBADOS.

CAPTAINE STRONGE saith, that at the Barbadoes there was an oath called the oath of fealtie administered to the people, wherein they swore fealty to my lord of Carlile, and as he hath heard Some have bin threatened to be put in prison for refuseinge it, that the oath was administered to this Examinate but he refused it sayinge he was not an Inhabitant, but a merchaunt, and free in any place for a yeere without takeinge any oath : that the people hold themselfes by it and beleevs it is generally taken, and that the people still retaine it as they told him when he came thence in August last : that he came to knowe it by reason of his speakeinge to them of somethinge which they refused to doe sayinge they could not doe them by reason of their oath to my lord of Carlile to whom they should be Traitours if they should breake their oath.

JOHN WIBORNE saith, that the Governour suffereth noe man to be of the graund jury till they had first taken the oath of fealtye.

ST. CHRISTOFERS.

WILLIAM ROPER saith, that he hath heard that an oath of fealtye was read but this examinate did not take it.

LEIUETENT. COLL. WELDINGE saith, they were enioyned the oath of Supremacy, and as this Examinate remembers it hath a clause of fealty to the Earle of Carlile.

IMPRISONMENT—BARBADOS.

CAPTAINE ROBERT DENNIS, marriner, saith, that Cap-

taine HENRY HAWLEY invited Capt. JOHN POWELL then Governour at the Barbados with others aboard his shipp to breakefast, and when he had htem there, he toke them as prisoners, and clapt them in Irons and tyed POWELL in Irons to the maine mast of his shipp, and carryed them to St. Christofers where they were afterwards taken prisoners by the Spaniard and that POWELL dyed in the Indies. Saith that Capt. HAWLEY was Captaine over him this Examinate, and that HAWLEY carryed the King's letter which Commanded POWELL aboard. And saith that he had the letter after he came to Barbados. Saith afterwards that he sawe the outside of the letter, but neither read it, nor heard it read. Saith he knowes not what power HAWLEY had, but saith that HAWLEY tould this Examinate, that the letter was to settle the Governmt. of the Barbados in such as he should appoint under the Earle of Carlile.

CAPTAINE PETER STRONGE saith. That some were imprisoned in CAPT HAWLEY's tyme, but for what cause knowes not but the common vote was for not doeing things contrary to their Judgmt. and because they would not submit to their yoake, that in Sir HENRY HUNCKS tyme the Vestry of Christ's Church to the number of 12 or 14 Comeinge in a seasonable tyme of the day with a petition to the Governour without any tumult, beinge in a Store-house drinkinge, and adviseinge who should deliver the petition, were by Commaund from the Governour apprehended and imprisoned three or foure dayes before they could be heard or have their answer.

GELL IMPRISONED.

That in the yeere 1640, one GELL a master of a shipp was imprisoned by a letter from Antigua at the Bar-

bados 24 houres for refuseinge to bringe a woman formerly banished from thence backe to Barbados againe, although there was noe satisfaccion offered for her passadge.

CAPTAINE ACKLAND saith, that he was committed three houres by the nowe Governour BEEL for not entringe into bond not to carry any thinge off the Iland without the Governours tickett, that this Examinate was committed by order of the Governour Councell and Assembly. That the occasion of this Examinates refusall was, that haveinge severall tymes before entred into such bonds, he would not enter into any more till he had his former bonds delivered in, whereupon he was imprisoned and noe Baile would be taken, though very good Baile offered, soe that this Examinate constrayned to enter into bond, the Condicion whereof was, that he should not carry any goods off the Island without the Governour's Leave.

DAVISON IMPRISONED.

MR. DAVISON saith. That in the yeere 1641, hee this Examinate was imprisoned by Sir HENRY HUNCKS, for takeinge a Storehouse, and puttinge goods in it without Licence: he was in prison a night, and the next day the Governour told him, that there was an Act of Councell in the Countrey that none should take a Storehowse without Lycence.

FUTTER IN PRISON.

That FFUTTER was in prison in HAWLEY'S tyme, that this Examinate hath gone in the night tyme to carry him drinke and not permitted to goe to him in the day, that he gave FFUTTER a bottle of Stronge water to drinke who afterwards told this Examinate, that they were

forced to doe the necessityes of Nature in the Roome where they lay, and this Examinate conceives the occasion to be by reason of some spleene betweene HAWLEY and him.

THOMAS BASTON saith. FFUTTER was in prison a yeere.

POWELL IMPRISONED.

CAPT. BUNDOCKE saith, hee was at the Barbados in the yeere 1629 when Captaine POWELL was Governour of that Island, and that Capt. HAWLEY came there in the ship *Carlile,* and that HAWLEY did invite POWELL and other Gentlemen aboard to breakefast, and that they were taken prisoners by a Guard of Musketteirs, and clapt in Chaines, and saith that Capt. RAMSAEY was a Cheife Actor in the business, yet saith he was not in the ship *Carlile* when they were at breakfast, but was then ashore, and that this Examinate went not aboard the *Carlile* till some fewe dayes after, when the Island, was most parte of it in HAWLEY'S hand and all quiet then this Examinate took occasion to goe aboard HAWLEY'S shipp where he sawe Capt. POWELL and KEMP prisoners in Chaynes at the maine mast, and Saith that they were their prisoners about three weeks or a month, and that after they went to Meabis* where the shipp was taken by the Spaniards where they were alsoe taken, and were all the while before in Chaynes.

ROBERT HORNE, Seaman, Saith, That about two yeers since, there beinge a difference at Mountserrat betweene the English and the Irish, this Examinate did deliver halfe a barrell of powder to the English, And that afterwards by direccion from Governour BRISKETT, Sr. THOS.

* Nevis.

WARNER did clap this Examinate in prison, as he told this Examinate for releiveinge the Rebells meaneinge the English, as he tould this Examinate.

Whippinge—Barbados.

WIBORNE.

JOHN WIBORNE saith. That at a Sessions in the Barbados he was sentenced to be whipt and that he was accordingly whipt.

THOMAS BASTON saith. That he knowes WIBORNE was whipped.

ST. CHRISTOFERS.

JAMES ASTREY saith. That there were some whipped in the yeere 1629 or (30), which he knowes. Sawe one ffrench whipped for foure dayes togither for speakeinge against Bishopp ABBOT, when he was whipped he had a paper in his hat, knowes not the words, saith it was against the Bishop and some of the Councell, and saith that this was done by the Governour and Councell, without any Jury.

Pillouringe—Barlados.

FUTTER.

THOMAS BASTON saith. That FFUTTER stood on the Pillory an houre in a violent hot day betweene twelve and one of the Clocke without his hat, it beinge then soe parchinge hot that the Sunne peirced his skull, and that he was sentenced by the Governour to stand with a paper on his hat, that the cause of his sentence was for that he tould Major READ the Judge of the Court in open Courte, if all whore masters were taken off the Bench, what would the Governour doe for a Coun-

cell and said further in the Court that my lord of Carlile himselfe was somewhat too much given to drinke.

Saith, WIBORNE stood on the Pillory two houres after sunne set, starke naked from the waist upward when the flyes called the Minewaige were very busy, soe that he had as good have had as many needles about him, and that his offence was because of a difference betweene Master HILLIARD and him, knowes nott he reason of that difference.

JOHN WILBORNE saith. That he stood on the Pillowry his ears nailled to the pillory with ten-penny nailes, and that when he was whipped his doublet was off, but not when he was on the pillory, and that he should have stood two houres on the pillory, but did not stand soe long by reason the sunn was almost downe when he was put in the pillory, and was not to stand after sunne set, that his sentance was for writinge a booke which they tearmde a libell.

STIGMATIZING AND CUTTING OFF EARES.

JOHN WIBORNE saith. That he was stigmatized and that his sentence was by the Governour and Councell for Traitours to God and the Kinge.

THOMAS BASTON saith, that WILBORNE was stigmatized.

CAPTAINE STRONGE saith, he saw WIBORNE stigmatized, and heard the Iron hisse on his cheeke.

CAPTAINE STRONGE further saith, that a servant to one BOLTON did loose his eares for a Cheate, BOLTON haveinge cheated this Examinate with bad Cotten, did cause his servant owne the fact, for which his servant lost his eares, and for it his master gave him his freedome.

Death—Barbados.

TUFTON.

CAPTAINE JOHN DUE makes a lardge relacion concerneinge Sr. WM. TUFTON* whom he saith HAWLEY caused to be condemned by a Councell of Warre, and that he was by that sentence shot to death, and six more of his Companye did cast Lotts for their Lives, and that one of them FLOORY a Chirurgeon was hanged, but all this Reportes but by relacion from others, and nothing of his owne knowledge.

MR. ROBERT QUOITMORE makes a lardge relacion of a discourse that passed betwixt Captaine HAWLEY and him at the house of Commons dore, and that HAWLEY should tell this Examinate, that they were onely three men executed in his tyme, vizt. TUFTON,, FFLOORY, and MORGAN, and that TUFTON was shott, aud the other two hanged, and that this Examinate demandinge of HAWLEY how they were put to death, he tould this Examinate it was by Martiall Lawe, and that he had a Commission

* Sir William Tufton was the 5th son of Sir John Tufton of Hothfield in Kent and brother of Sir Nicholas Tufton, who was created Baron Tufton and Earl of Thanet, successively.

In Berry's *Pedigrees of the Families of Kent* (London, 1830), Sir Willliam Tufton is said to have been created a Baronet of Ireland, and to have married a daughter of a Cave of Leicester. *Beaston* does not mention any Baronetcy in favour of Sir William Tufton. In Hasted's *History of Kent*, (Vol. 2, p. 129), Sir William Tufton is said to have been created a Baronet of Ireland, and to have married a daughter of Cecil Cave, his eldest son by whom, Sir Benedict Tufton, succeeded him in title and Estate. In the 5th edition of Collins (Vol. 3, p. 325) the same account of Sir William appears, with the further detail that his wife's name was Anne. His three sons died without issue, and his only daughter married Sir Thomas Beaumont of Gracedieu, Leicestershire.

from the Earle of Carlile to doe it, but was scrupulous of it and called some of the Island to him.

CAPTAINE STRONGE saith. That he hath knowne onely one man executed, whose name was HUTTON and his offence was for killinge his owne Leiutent., for which he was tryed by the Common Lawe, by a Jury; and that himselfe begged that he might be shott to death, and soe he was accordingly executed.

St. Christofers

SHORT.

WILLM. ROPER saith, he hath heard there was one SHORT hanged at St. Christofers, but sawe him not suffer, nor knowes for what offence he suffered.

JAMES BARREY, saith, that one SHORT was hanged about sunsett, and that all the Countrey were thereupon in Armes the next day, and saith that SAMLL. SHORT beinge upon some occasion brought into the Court (this Examinate beinge then a Cunstable though of another division) that SHORT did call one Leiuetent. JEFERSON Traitour and was to have bin burnt in the tongue, but askeinge pardon was acquitted and had his liberty, but afterward SHORT was imprisoned for callinge Coll. JEFFERSON, Murtherer and Traitour in open Court, but this Examinate knowes not whether the said SHORT had cause or not, whereupon they said that he was the King's Subiect, and appealed to CESAR if he could have noe iustice there; that afterwards SHORT was seized in his bedd, that this Examinate was then seaven miles off, knowes noe other occasion but for boastinge of the same words. That the next day the Countreye were all in Armes, that Sr. THOMAS WARNEE'S Sonne went that

night to the ffrench Generall's to demaund aide of him, that the ordinance were dismounted at that tyme by Commaund of Coll. POWELL, and contynued soe a month after, that the ffrench came not at that tyme, this examinate Sawe not SHORT put to death, but saith, that this Examinate's servant went and sawe him put to death.

The "Automatic Megass Firemen."*

By W. Price Abell.

IN Lancashire a maxim most thoroughly worked up to is, that "a man saved is one thousand pounds gained." In this colony we all recognise and appreciate the fact that labour saved is labour available for other work, particularly at this present time of the eflux of men to the Gold placers, and the ravages of influenza amongst our working population; at a time also when every penny that can be saved must be saved.

To-day I am certain of your interest in what is herein described, because it is a labour-saving device so remarkably simple that it scarcely requires description.

The usual method of handling megass hitherto has been to drop it from an elevator, carrier, buckets or boxes, into the megass platform, from thence regulating and pushing it by labour, rolls, or gearing into the respective furnaces, this being laborious and requiring much attention.

With this brief account of the past condition of megass firing to facilitate the description of my "automatic firemen" I will proceed to describe the invention.

My object is to reduce the labour on megass platforms, as now used, and at the same time to facilitate the combustion of the megass, by replacing human firemen by "automatic mechanical ones."

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* Read before the Society's Meeting, July 14th, 1892.

The megass is carried the whole length of the platform by the usual rake carrier, this being connected with each furnace by "enclosing hoppers," down which the megass falls direct into the furnace until it is supplied, and the hopper is sufficiently full to cause the carrier megass to pass over that in the hopper; in other words a portion of the megass in its progress along the bottom of an ordinary carrier falls into the first fireman or enclosing hopper till it is full, then passes over the megass therein to the next, and so on, thus keeping a whole series of furnaces automatically supplied with megass, each taking its share to make up for that burnt in each furnace.

The surplus megass can be discharged at the carrier end, or stored between each furnace, by opening intermediate doors that are under the easy control of the overlooker as shown.

No human firemen whatever are required except in the buildings, where and when the megass furnaces are not stopped with the mills; in which case, by simply opening the door at the bottom of each enclosing hopper, the furnaces can be fed by men in the usual way.

The man in charge simply regulates the damper to give the necessary steam, and the intermediate doors to prevent too much surplus megass accumulating at one place; he will also see by means of the peep holes or slots in the hoppers or firemen, that each furnace is taking its proper feed.

MARKED ADVANTAGES OF THE "AUTOMATIC FIREMEN."

1st, saving labour; 2nd, no firemen whatever required no matter how many boilers; 3rd, less than half the usual

number of megass backers or box-men required; 4th, pays for itself in a grinding; 5th, no power and no gearing required; 6th, absolutely "automatic"; 7th, gives a constant, regular feed which greatly facilitates perfect combustion; 8th, prevents cold air entering the furnace mouth.

MARKED CHARACTERISTIC OF THE "AUTOMATIC FIREMEN."

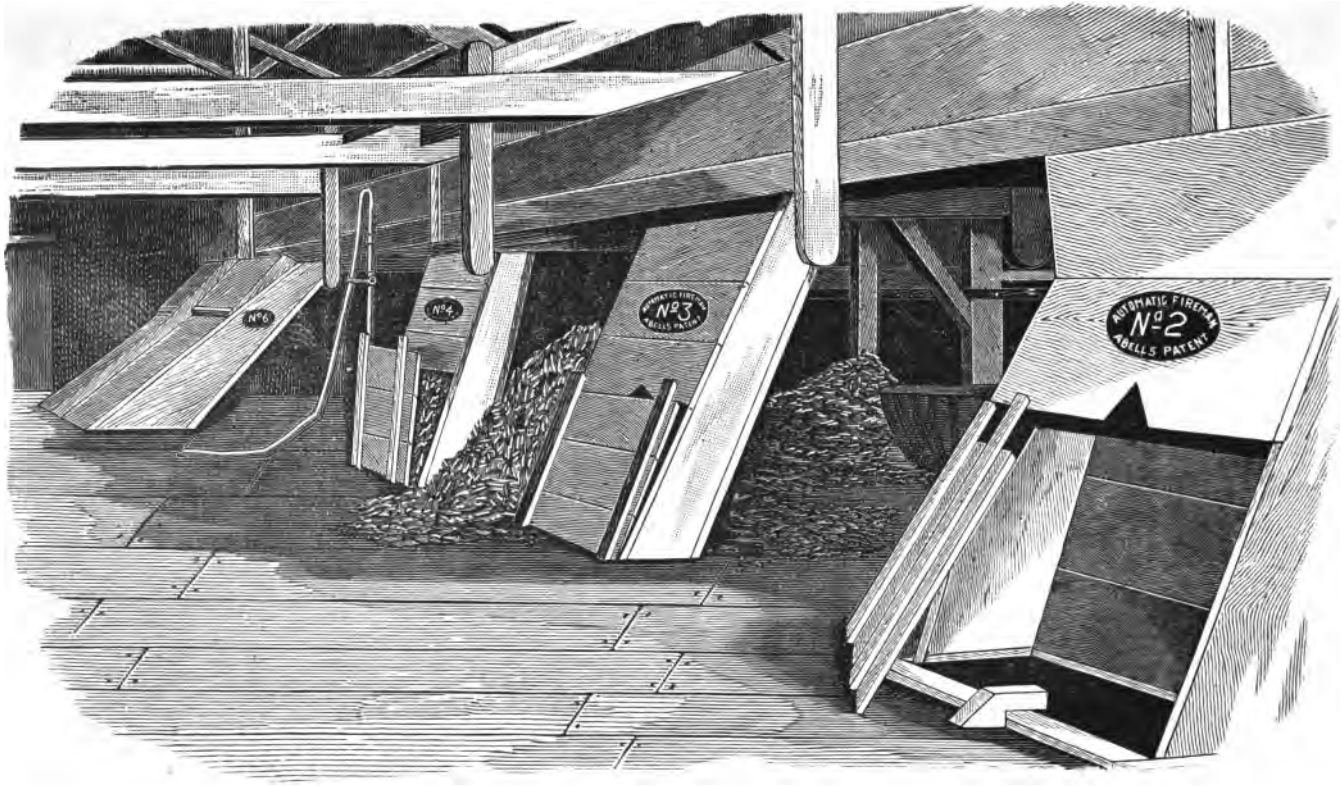
1st, a hopper so arranged that when the furnace is sufficiently supplied with megass, the megass isau tomatically caused to pass on to the other furnaces; each taking automatically a quantity equal to that burnt; 2nd, A. B. C. simplicity.

Through the kindness of the Hon. W. CRAIGEN, any one interested in megass firing can see the above stated facts borne out in practice on the first estate to adopt these automaticfire men.

There, Mr. DAWSON tells me, two men now do the work that previously required fourteen, in other words the estate now has twelve able bodied men at liberty for other work, the result being that besides a direct saving of at least $26 00 per week in labour, two-thirds of this is saved entirely by the automatic firemen. The photograph will give a good idea of the apparatus in full work, and the blue prints will show the styles adopted for various carriers.

Many contrivances have been used hitherto such as mechanical stokers, flaps, and other means by which megass and air can be supplied to the furnaces of steam boilers for the purpose of obtaining good combustion, all of which have been found more or less imperfect.

By this statement I do not mean that any particular method of firing will produce any more heat from a


No6
No4
No3
AUTOMATIC FIREMAN
ABELL'S PATENT
AUTOMATIC FIREMAN
No2
ABELL'S PATENT

pound of megass than nature put into it; just as good results can be obtained from careful hand-firing, as from my Automatic firemen. In the first instance, good men are expensive; in the latter the very principle of the invention necessitates its fufilling the two most important functions of preventing air entering at the furnace mouth, and giving the furnace a regular supply of megass in order that it may be dried before entering into combustion. I refrain from saying more on this now, but I hope ere long to have the honour of laying before you some interesting observations on furnaces.

It is just as essential to good economy that the boilers should have the very highest initial or furnace temperature, the highest possible steam pressure, and the lowest possible chimney temperature, as it is for the engine to be economical under similar conditions of high initial pressure, and low terminal temperature.

I do not care to use my privileges as a committee man of this society to advertise the apparatus I have recently invented and carried out with the assistance of Mr. DAWSON, but I may state, that though simplicity itself, it is none the less effective, and, that there is not a megass platform in the colony where this invention would not save from 50 to 90 per cent of labour.

Report of Meetings of the Society.

Meeting held on the 14th July.—Hon. A. Weber, President in the chair.

There were 14 member present.

Elections.—*Members:* Revds. T. W. Halliday and R. A. Powell and Mr. H. T. Moore.

Associates: Messrs. J. L. De Souza, A. D. Ferguson, Jose Viera, R. C. Roach, J. N. Shaffer, and James Cameron.

In answer to a question of Mr. Jacob Conrad the President said that he had not yet brought forward his motion for an Agricultural School as it involved a grant from the Government which he was afraid could not be procured at present. He would however bring it forward at the next meeting.

Mr. W. Price Abell read a paper on the "Automatic Megass Firemen" (see page 350.)

Mr. R. G. Duncan spoke of the results of some experiments of the Colonial Company in economising fuel by improvements in furnaces. Since 1890 these had been carried on with the result that now 1½ to 1¾ pounds of water were evaporated by a pound of green megass, whereas formerly only about three quarters of a pound was evaporated by the same quantity. The form of furnace now adopted by the Company was the same that Mr. Abell had figured and he had listened to the paper with considerable interest.

A vote of thanks was accorded to Mr. Abell.

The President informed the meeting that the Directors proposed to have a Conversazione in the Reading

Room and Museum at the time of the Bishop's Jubilee. The date and form of the entertainment had not yet been fixed, but he hoped that it would be a success and merit the approval of the members.

Mr. Quelch, referring to a question of the Hon. N. D. Davis at the previous meeting, said he found a record of Mr. Davis's presentation of silver coins to the Museum some years ago, but could not trace them. The gentleman then acting as Curator was dead and no one could inform him what had become of them.

The meeting tben terminated.

Meeting held on the 11th August.—Hon. A. Weber, President, in the chair.

There were 12 members present.

Elections.—*Members:* Messrs. J. J. Pike and Angus McNab.

Associates: Messrs. Bertie Ross, R. C. Smith, J. Bourke and H. R. Stevens.

The President mentioned that Friday the 19th instant, had been fixed for the proposed Conversazione, when he hoped there would be a large attendance of members and associates.

The President brought forward his motion for an Agricultural School of which notice had been given at a previous meeting. He had postponed the matter for several meetings on account of its importance, and because, not being a planter the responsibility weighed upon him. In bringing it forward now he did so that it might be referred to a Committee who would be better able to deal with it. They were all aware this was an

agricultural colony and would be always dependent to a great extent on the cultivation of the soil. He thought the Society should take a prominent position in developing its resources, not alone the sugar industry but all others. They should do something towards teaching the peasantry to provide for their own tables, as well as to cultivate articles that would give some return. In other colonies sugar was not the only industry, but cocoa and coffee were grown, and these had already been among the products of this colony. If the Society had a Model Farm under its charge, where young men could be taught agriculture, he was sure it would be a benefit to the colony. One reason why he had deferred his motion was his fear that under present circumstances the Government might not be willing to assist them. He thought however that something should be done. In other countries such institutions were in existence and the Government had plenty of land at its disposal. Sometimes they had an over supply of plantains; these might be utilised as flour. Then bananas could be dried and shipped to advantage. If the meeting agreed to the general principle of the motion a Committee might formulate the main points of a scheme for carrying out the project.

Mr. J. Wood Davis in seconding the motion, said it would, if carried, meet with the approval, not only of the members of the Society but the community at large. An Agricultural school was undoubtedly necessary, and he thought that as such an institution concerned the progress of the colony, the Government would not hesitate to give the necessary grant.

Mr. Watt said that as the motion stood it pledged the

Society to carry out the project: he would vote for it if it was understood that the Committee was only to take it into consideration.

The President agreed to strike out the words "and makes arrangements to carry out" with the consent of his seconder. The motion then read

"That this Society takes into consideration the establishment of an Agricultural School for the agricultura leducation of the peasantry of this colony, to be under the supervision of the Society."

Mr. Conrad, the Hon. N. D. Davis and Mr. R. G. Duncan spoke in favour of the motion, which was put to the vote and carried unanimously.

The following gentlemen were then nominated by the President as a Committee to consider the matter, and approved by the meeting:—

Prof. J. B. Harrison, Hon. A. Weber, Hon. E. C. Luard, Hon. D. M. Hutson, Hon. A. Barr, Messrs. S. R. Cochran, Jas. Gillespie, Wm. Marr, Jacob Conrad, Geo. Garnett, R. G. Duncan and E. Percival, with power to add to their number.

Mr. Æneas D. Mackay called attention to the fact that a stigma had been cast on Canadian flour in this Market, it being stated that it does not keep so well as that from the United States.

The President having asked Mr. Mackay to bring forward a motion on the subject, Mr. Mackay gave notice as follows:

"That in view of expected closer relations between this colony and the Dominion of Canada, it is advisable that this Society appoint a Committee to investigate certain allegations that have been made as to the unsuitability of Canadian flour for this market on account of its not keeping good as long as that from the United States."

A communication from Mr. W. P. Abell in reply to

Mr. Duncan's remarks at the previous meeting on the Megass Firemen was left over until the following meeting, when Mr. Abell might be able to attend in person.

A communication from Messrs. Conrad, Son & Co., accompanying a collection of photographs of Electric Light and Power Machinery from the Thomson-Houston Company was read. The thanks of the Society were accorded to the donors, and the photographs ordered to be exhibited in the Museum.

Mr. Quelch reported having received a collection of Confederate notes, several lots of coins and a number of miscellaneous specimens for the Museum, for which the thanks of the Society were also accorded.

A portrait of the late Sir James R. Longden, sometime Governor of the colony, was laid on the table.

The meeting then terminated.

Meeting held on the 8th September.—Hon. A. Weber, President, in the chair.

There were 9 members present.

Elections.—*Members:* A. E. Messer, H. Sproston, Junr., M. Juister, Dr. J. E. Godfrey, W. Laurie Thomas and Hugh Smith.

Associates: George J. Dare, Fernand das Neves e Mello, Louis Souter, A. J. Hohenkirk and Jas. Edgar.

Mr. Æneas D. Mackay brought forward his motion, of which due notice had been given, for an enquiry into certain allegations made in the colony in reference to Canadian flour.

In bringing forward this matter Mr. Mackay said he did it with some diffidence as he was not a Water

Street merchant, but he had received letters from the Secretary of Agriculture and other gentlemen in Canada in which the matter had been referred to and he thought it his duty therefore to bring it forward. He had been told that Canadian flour would not keep and that it made bread too spongy. They were trying to bring their staple product to the notice of Canada and as a matter of inter-colonial courtesy he thought they should enquire into this matter. He would suggest that the Committee be composed of Messrs. F. A. R. Winter, B. S. Bayley, Thos. Daly, R. W. Edwards, Prof. J. B. Harrison and the President.

Mr. Watt seconded the motion and proposed that Mr. Mackay be added to the Committee.

After a short discussion the motion was carried unanimously together with the proposed Committee.

It was agreed also that the Committee put themselves in communication with Captain McLeod, Agent for Canada.

In the absence of Mr. W. P. Abell, his communication in *re* Megass Firemen was left over.

On the suggestion of Mr. Watt the Assistant Secretary was directed to apply to the Government for a copy of the Report of the Commission on Opening up the Country, and bring it before the next meeting.

A letter from the Government Secretary was read, informing the Society that Dr. Hermann Paasche, Professor of Agriculture at Marburg University, intended to visit the colony to study the details of the sugar industry. His Excellency the Governor desired that the Society would afford him every assistance possible in the object of his mission.

The Assistant Secretary was directed to reply that the Society would do all in its power to assist Dr. Paasche.

The meeting then terminated.

Meeting held on the 13th October.—Hon. A. Weber, President in the chair.

There were 21 members present.

Elections.—*Members:* Messrs. Richd. N .Blandy and H. Amson.

Associates: John B. Humphrey, D. C. Cameron, Percy Vyfhuis, B. H. Bayley, J. S. Mendonça, Edgar Furbush, and J. R. R. Niles.

Mr. T. S. Hargreaves gave notice of motion as follows:—

"That the Royal Agricultural and Commercial Society take into consideration whether it would not be advisable to urge the Government to offer inducements to persons to experiment in the cultivation of tobacco on the Essequebo and Potaro—vide Professor Harrison's Report."

The Secretary read a letter from the Government Secretary covering a Circular from the U.S. Government containing queries as to cotton cultivation in the colony.

The Secretary was directed to reply that no cotton was grown here, and therefore the queries could not be answered.

A second letter from the Government, covering the "Kew Bulletin" for July and August 1892, and calling attention to the "Report on Cane Borers in the West Indies" therein contained, was also read.

The President thought this report should be of great interest to the planters, and on the suggestion of Mr. Æneas Mackay it was referred to the Agricultural Com-

mittee. The Secretary was directed to thank the Government for the communication and report.

A letter from J. M. Gaskin, Barbados, offering to recruit Barbadian labourers for the planters of the colony was also referred to the Agricultural Committee.

Mr. Abell's communication on his Automatic Firemen was again allowed to stand over in the absence of the writer.

The Chairman stated that he was sorry to hear (although it had not been officially notified to the Society) that Mr. B. Howell Jones who had been commissioned by the Governor on the recommendation of the Committee to represent the colony at the Columbian Exposition, had resigned. If this was the case he thought something should be done to recommend another gentleman.

The Secretary of the Exposition Committe stated that a meeting of that body was to be held on the following Monday, when the matter would receive attention.

The Chairman stated that in accordance with the resolution of the previous meeting a copy of the Report of the Government Commission on the best way of opening up the country had been procured and now lay on the table and was open to discussion.

Mr. Watt asked if the Government had supplied the copy to which the Chairman answered in the affirmative.

Mr. Mackay said he rose to a point of order. Under the sixth section of the Society's Act of Incorporation it was stated that "an essential principle of the constitution of the said society shall be the total exclusion at its meetings, and its proceedings of all questions of a political nature or tendency; and which principle no

Resolution nor Bye-law shall on any account or pretence whatever, at any time infringe or controvert." Mr. Watt had stated at the previous meeting, when asking that this report be considered, that it was analogous to the paper of Mr. Kenrick read before the Society last year. In this he (Mr. Mackay) did not agree. In the report in question there were two sides, that of the majority and that of the minority. If in discussing it they adopted either they would be bringing in politics. In 1886 Mr. Julius Conrad had been ruled ont of order by the then Chairman when bringing forward notices of motion in connection with the married women's property laws and he (Mr. Mackay) thought the discussion of this report also out of order. He would be bound to abide by the Chairman's ruling, but if this went against him he would enter his protest against any discussion on the report. Further, in the event of the Chairman's ruling being adverse to him, he would ask that the discussion be postponed until the opinion of their legal adviser as to whether or not the question was political, be obtained.

Mr. Watt said that as his name had been mentioned he would give his reasons for asking that this report be obtained. The question of opening up the country had been discussed by the Society, and a resolution forwarded to the Government, the outcome of which appeared to be the Commission and its Report. Mr. Mackay himself had taken part in that discussion and said that " if the Government would only guarantee the interest there would be no difficulty in raising money for a good scheme." Even Dr. Carrington, Chairman of the Commission, had spoken of this matter before the

Society; now the Government had supplied a copy of the Report; and he hardly thought it reasonable to object at the eleventh hour.

Mr. Hargreaves begged to remind Mr. Mackay that it was through the instrumentality of the Society that the Commission had been appointed and if its report was to be regarded as political he did not know what they could discuss.

The Chairman said he stood in the invidious position of President of the Society and one of the Commissioners who had edited the minority report. Further he happened to be a member of the Court of Policy, where the report was discussed the other day. For his own part he did not see the slightest objection to discussing it. It was an important matter in which the Society had always taken the greatest interest. When it was before the Court of Policy the Governor in winding up the debate said that the proposed resolution did not bind the Court further than to provide for surveys.

Mr. Sproston proposed, to save time, that the report be discussed.

Mr. Mackay asked for the ruling of the Chairman, on which the President said he ruled that the meeting could discuss the report.

Mr. Mackay further asked whether the question would not be referred to the Society's legal adviser to which several members replied they had none.

Mr. Sproston expressed his willingness to pay to have the point settled.

Mr. Bayley said it was only a few months since they had discussed the Insolvency law of the colony, the Chief Justice himself being present. If they could talk

about one of the ordinances passed by the Legislature he did not see why they should not speak of the report now before them.

Mr. Mackay said he still protested against the discussion and wished to have the fact recorded on the minutes.

The Chairman said the report was open for discussion.

Mr. Hargreaves said that his daily work made him acquainted with the wants of the gold diggers and they desired that something be done at once. On reading the Report of the Commissioners however it appeared to him as if that something might be accomplished in the year two thousand, when those present would not be alive. In eight months of this year from February to September the number of labourers registered for the gold fields was 13,937, almost double that of last year. It took six or seven days to reach the Potaro and Conawarook and cost at least a dollar a day for each man. An expedition cost about two thousand dollars, half of which might be saved if proper means of communication were offered. Five thousand new labourers had been taken on this year, and they would have to find more men to develop the industry. Their losses were considerable on account of sickness and the inability to reach a hospital when taken ill. It was necessary that proper means of communication should be opened immediately, and if this was not done the industry would suffer. None but the negroes of British Guiana were fit for the work and therefore they must take care of them.

Mr. Winter said he was surprised at the opposition from a certain quarter to have this matter discussed.

He could understand Mr. Hargreaves desiring to have communication with the gold fields established. When this was done it would not benefit this one industry alone, but open up a new district the resources of which are at present unknown. He had taken a deep interest in this matter and thought that if the Society took it in hand so warmly as on a previous occasion something would come out of the Report and that speedily. He advocated the opening up of the country generally but they would have to make a beginning, for unless this were done they would always be in the same place.

Mr. Jacob Conrad said he was strongly in favour of opening up the country, but not by the Government. History and experience showed them that when a country had been opened up, it had always been the result of private enterprise. They must not forget that gold washing was uncertain and they must take account of other things as well. He thought that the country should be well surveyed before putting down a railway and that this should be done as soon as possible.

Mr. Sproston said he had initiated a scheme for opening up the country which was put before the Government two years ago. This was mainly to facilitate the gold industry. Like Mr. Hargreaves he did not believe the country could be opened up by European labour. The inhabitants of the colony would have to do it or it would not be done at all. After saying something of his scheme which the Government had rejected, he went on to speak of the necessity of doing something at once. He was largely interested in the gold industry and he could say that much sickness prevailed among the labourers. Means of communication must be quickly estab-

lished or the industry, which had been the back-bone of the colony for two or three years, must collapse.

Mr. G. Garnett said he would like to mention in regard to the uncertainty of placer washing that if there were greater facilities for access to the gold fields, workings that would not pay now could be made to yield good profits.

Mr. Hargreaves said he would now move a resolution, on which Mr. Mackay objected that Mr. Hargreaves could not speak twice; he ought to have brought forward his motion at first.

The Chairman having ruled that the proposed resolution was in order.

Mr. Hargreaves moved and Mr. Sproston seconded:—

"That this meeting of members of the Royal Agricultural and Commercial Society, having discussed the Report of the Commission on opening up the country, forwarded by the Government, and being fully impressed with the difficulties of transport to the gold fields of the Essequebo and Potaro, desires to urge upon the Government the pressing necessity of immediate measures for providing convenient, safe and rapid communication with the said gold fields, and that a copy of this resolution be forwarded to the Government Secretary."

This was carried unopposed, Mr. Mackay declining to vote.

Mr. Watt gave notice of motion as follows:—

"That a Committee be appointed for the purpose of considering the desirability of having the Ordinance of Incorporation amended."

Mr. Quelch gave a list of recent accessions to the Museum, for which the thanks of the Society were accorded.

The meeting then terminated.

Meeting held on the 14th November.—Hon. A. Weber, President, in the chair.

There were 12 members present.

Elections.—*Members:* Messrs. Cecil Morris and J. H. Powell.

Associates: Messrs. J. Henderson, W. E. Hughes and Thomas Elliott.

The President said he wished to mention before proceeding to the business of the meeting the great loss which the colony had sustained in the death of their venerated Bishop. His Lordship during his long residence in the colony had taken a great interest in everything connected with its progress, and he therefore thought they should record their sorrow and sympathy with his friends. It would be almost superfluous on his part to say anything about the virtues of their beloved Bishop, because he had been so well-known to all members of the community, and respected and loved by every one no matter of what denomination. He would ask them to support him in his proposition to forward a sympathising letter to Mrs. Hamblin, the Bishop's daughter, who was the only member of the family then in the colony. He would move that a letter of sympathy to Mrs. Hamblin in her great bereavement by the loss of her father be forwarded in the name of the Society.

This was seconded by Mr. Geo. Garnett and carried unanimously.

The Secretary read the annnexed report of the Agricultural School Committee.

The President stated that this matter had been most carefully considered, the Committee having the advantage of a report from Mr. Jenman, the Government Botanist. The great difficulty was the lack of interest among the people likely to be benefited by such an institution. There were already opportunities

of learning practical agriculture on every sugar estate and there were two or three cocoa plantations where those who wished to learn could do so. Then such a School would be very expensive and the benefit not commensurate with the cost. The Committee thought therefore that until the people showed some desire for such an institution it would be as well to abandon the idea.

On the motion of Mr. Mackay, seconded by Mr. Cochran, the report was nnanimously adopted.

The Secretary read the annexed report of the Canadian Flour Committee.

Mr. Mackay asked that the papers should be allowed to stand over until the proposed experiments were carried out. Meanwhile perhaps the "Daily Chronicle" would publish the Proceedings of the Committee.

This was agreed to.

The President reported that a meeting of the Exposition Committee had been held, at which Mr. B. Howell Jones tendered his resignation as Commissioner, and Mr. Jacob H. De Jonge was nominated in his stead. This nomination had been forwarded to His Excellency the Governor, but up to the present nothing beyond a formal acknowledgment had been received.

Mr. Hargreaves brought forward his motion, of which due notice had been given, that the Society urge the Government to offer inducements for tobacco cultivation. He knew little of tobacco himself, but he had bought good cigars on the Venezuelan side of the Amacura, and did not see why it could not be grown here as well. He did not expect that anything like that of Havana could be produced, in the colony, but he certainly thought some-

thing equal or superior to the common quality imported could be grown.

Mr. Æneas Mackay seconded the motion.

The President by permission of the Meeting, asked Mr. Scott, a visitor to the colony, well acquainted with tobacco cultivation to give his views on the matter.

Mr. Scott said he had only examined the soil in two or three places on the Demerara River and at Morawhanna, but so far as he had seen there were none suitable for tobacco cultivation. He had seen Professor Harrison's analysis of the particular soil referred to by Mr. Hargreaves but did not think it rich enough for tobacco.

Mr. Hargreaves called attention to Bye-Law 1, Chap. xiv., referring to Premiums, and suggested that the Society might do something in that way as there was a person in Berbice willing to make some experiments if he got a little assistance.

The President stated that the Directors had no funds for such a purpose.

After some further discussion the matter was referred to the Agricultural Committee.

Mr. Watt asked that in consideration of the small attendance his motion might be postponed to the next meeting.

A communication from the Government Secretary acknowledging the receipt of the Resolution on the subject of "Opening up the Country," passed at the previous meeting, was laid over.

A communication from the Royal Palm Nurseries, Florida, offering Sisal Hemp plants for sale was taken for notification.

The thanks of the Society were accorded for the following donations :—

From W. I. & P. Telegraph Co.—Cable Sections, Trinidad-Demerara.
„ Mr. Luke M. Hill.—Hebrew Lexicon.
„ Mr. Nils Schjander.—Burmeister's Thiere Brasiliens.
„ Association through Mr. Æ. D. Mackay.—Journal of Hamilton Association of Canada.
„ Author.— O'Ferral's Handleiding.

The President mentioned that the Rev. Canon F. P. L. Josa would deliver a lecture on the 29th instant on some Indian customs, of which due notice would be given.

The meeting then terminated.

REPORT OF AGRICULTURAL SCHOOL COMMITTEE.

Gentlemen,—By direction of the Committee appointed to consider the desirability of establishing an Agricultural School, I have the honour to report that they have held four meetings, at which the matter was discussed in all its bearings, and have come to the conclusion that while they consider such a School highly desirable, they do not think, in view of the many difficulties in the way of its success, that it is feasible.

I have the honour to be, Gentlemen,
Your obedient servant,
J. RODWAY.
Assistant Secretary.

REPORT OF CANADIAN FLOUR COMMITTEE.

Georgetown, Octr. 26, 1892,

To the President and Members of the. R. A. & C. Society.

The Committee appointed to investigate the allegations made in the colony against Canadian Flour have the honour to report as follows :—

They have met on three separate occasions and taken evidence from several members of the Committee as well as from the Hon. W. H. Sherlock and Messrs. C. G. A. Wyatt, C. G. Perot and J. Beatty. At two of the meetings a reporter was employed so that the evidence

might be recorded verbatim and utilised in any way the Society may think desirable.

After careful consideration the Committee have come to the following conclusions:—

1. That a prejudice does exist against Canadian Flour as compared with that from the United States. From the evidence of Mr. F. A. R. Winter, it appears that this is a revival of objections made forty to fifty years ago when flour was imported from Halifax and other British American ports in mixed cargoes of fish, staves, lumber, &c., where the lumber was often frozen in the hold. Stowed in that way the flour was often damp and soon became sour, which would not have happened if it had been kept separate.

2. That this old prejudice yet exists is shown from the fact that there is still a difficulty in disposing of Canadian Flour at the same price as American brands of similar quality, and again the bakers still complain that it will not keep good so long as that which they are accustomed to use.

3. Whether there is any truth in this allegation is doubtful, but it is possible that the Canadian packers are not so experienced in preparing flour for the tropics as those of New York who have been carrying on the trade for such a long time.

4. That a prejudice also exists against the shape of the Canadian barrels, which also have flat hoops, while the dealers are accustomed to see these round on the outside. This could be easily overcome by packing in the customary way, and one witness stated that the Canadian packers are already doing this.

5. That from the evidence of Mr. Beatty, who has had large experience in working with Canadian Flour in the United States, it appears that the product of the more northern territories contains more starch than that from the south, and therefore is not so nutritious and does not keep so well. The variety of wheat may also have something to do with this, the red kinds being more hard than the white.

6. Finally, after weighing the evidence, they do not consider the allegations proven, but that at the same time there is sufficient reason for a series of comparative experiments with different brands to settle the question once for all. Mr. Mackay has already written to Canada for samples, and on their arrival they would recommend that portions of

these be analysed by Prof. Harrison in connection with the most saleable brands used in the colony, and then the bulk be given to a baker who will undertake to make a most careful comparative experiment with bread, &c.

ARTHUR WEBER, Chairman.
F. A. R. WINTER.
ÆNEAS D. MACKAY.
THOMAS DALY.
R. W. EDWARDS.
B. S. BAYLEY.

Meeting held on the 15th December.—Hon. A. Weber, President, in the chair.

There were 22 members present.

The Secretary read the annexed report of the Agricultural Committee.

Mr. Howell Jones said in reference to this report that he was sorry to say that the Committee had only met twice that year. This was not very creditable, and he thought they should meet oftener as there were always matters of interest cropping up in connection with agriculture. He would however, only call attention then to the resolution of the Committee in regard to an assistant for Professor Harrison, the Government Chemist. No one who had followed that gentleman's work during the last three years could help appreciating it. With the aid of Mr. Jenman he had carried on a most interesting series of experiments on seedling canes. and this had been done in addition to his other work, A great deal of his time was taken up in routine work that could be done by an assistant. Under the Food Adulteration Act, which had been passed some time ago, provision was made for such assistance, but nothing had

been done. In other colonies the Chemist had his subordinates, even in places not considered so important as this colony. Here the Government Chemist had no help whatever except what was paid for from his own pocket. He felt sure that all present would agree with him in recommending the matter to the Government and that the President would think of it when sitting in the Combined Court.

The Hon. Dr. Carrington agreed with Mr. Jones that Professor Harrison required an assistant. An amount had been put on the estimate for this purpose but the Combined Court had refused to pass it.

The Hon. W. S. Turner said that if the Adulteration Act were put in force it would be impossible for the Government Chemist to carry out its provisions. He had seen with pleasure the result of some of Professor Harrison's work in Barbados and certainly thought he needed assistance.

The President said that although not an agriculturist, he had heard of Professor Harrison's experiments and their good results both here and in Barbados. He should be happy to do all he could to assist him in his good work, and would propose that the report be adopted.

This having been seconded by Mr. Jones, it was carried unanimously, and the Secretary was directed to forward a copy of the resolution to the Government.

Mr. Jacob Conrad gave notice of motion as follows :—

"Whereas the Honourable A. Weber, President of this Society brought forward a motion that this Society establish an Agricultural School; and

Whereas a Committee has been appointed to draw up plans and report the same to this Society; and

Whereas the Committee held several meetings, and drew up such

plans and estimates indicating their scheme how such a School could be established:—

I shall therefore, at the next meeting, call for the reading of such plans as the Committee has prepared, and hereafter move that the motion now on the table be put to the vote."

The Secretary read a letter from Mrs. Hamblin acknowledging the receipt of an extract from the minutes of the Society showing sympathy with her and the colony at the loss of her father the late Bishop of Guiana, and thanking the President and Members for the kind manner in which his life-long work had been spoken of.

Mr. Watt's motion for amending the constitution of the Society was postponed with consent of the meeting, and at the request of the President.

The President said that before proceeding to the election of Office-Bearers for the following year he would give, as was customary, a retrospect of the business done by those now retiring, during their term of office. Unfortunately the present had not been a favourable year for either agriculture or commerce. In the first half the crop was forty per cent. less than during the same six months of the previous year, and this depression had been felt by all.

During the year fourteen meetings had been held, including the present, at which the average attendance had been only fourteen. The principal matters which had been considered at these meetings were Jewish immigration, the establishment of an Agricultural School, allegations against Canadian flour, Opening up of the Country and the Cultivation of Tobacco. They all knew the results of their deliberation on these matters; Jewish immigration was not considered practicable and the establishment of an agricultural school, although desirable,

not feasible. The latter question had called forth a great deal of discussion and he saw from the notice of motion just handed in by Mr. Conrad that it was to be brought before them again.

Two papers had been read before the Society, the first by Mr. Nevile Lubbock on his Mission to Washington in connection with the admission of our sugars into the United States, and the second by Mr. Abell on his Automatic Megass Firemen. There had been also two popular lectures in the evening, by the Hon. Dr. Carrington, assisted by the Hon. E. C. Luard, on the English Cathedrals, and by the Rev. Canon Josa on some Indian customs. All these gentlemen deserved the best thanks of the Society and he was sure they would all agree with him that the papers and lectures were of great interest. They hoped to be able to continue the series of Popular Lectures, and by making them a little more popular and less scientific to have a wider field for selection. There had been a Conversazione in August—an entirely new feature—and he believed the large number that attended were highly gratified. He hoped they would soon be able to have another as everyone then present expressed their desire to have it repeated. The Exposition Committee had been doing good work and the exhibits, which were very numerous, would soon be ready. The Governor had not yet appointed a Commissioner in place of Mr. Howell Jones, but he hoped that an arrangement would soon be made.

The library had received an accession of over eight hundred volumes, some of which had been bought from the estate of the late Mr. A. Campbell. Besides an extra grant for these, there had been another special

allowance for a lot of standard works, which together with the ordinary additions have much improved the collection.

There had been over eighty new Members and Associates elected during the year, but on account of deaths, withdrawals, and persons leaving the colony the increase had not been very great. The number on the roll at the beginning of the year had been 487 against 509 at the present time. They had lost by death the Hon. C. P. Austin, Mr. Arthur Campbell, Mr. G. W. Hinds, Revd. G. Salmon, Mr. B. J. Godfrey and only the previous week, Mr. F. A. Mason. Mr. Godfrey had been a very old member and a Director of the Society as early as 1853. He was sorry to have to report the loss of so many prominent members by death.

The museum had been kept in very fine order, and by the addition of a new gallery round the interior had been much improved. *Timehri* was still maintaining its old standard as a well-written magazine, and had by no means lost its interest under Mr. Quelch's editorship. As far as the staff of the Society was concerned, he begged to atate that they had worked with great willingness, and he had always received every attention and courtesy from them. He could also say the same for the Honorary Secretary, the Directors, and members of the several Committees to whom he was much indebted for their hearty co-operation during his term of office. This being the last time that he would occupy the chair as President, he would thank them all for the forbearance they had shown him during the year.

The President said, in proceeding to elect Office-Bearers for the succeeding year, he believed it was the custom and privilege of the outgoing President to pro-

pose his successor. He had therefore great pleasure in moving that the Honourable Dr. Carrington be elected President for 1893. It was not necessary to say much on his behalf as they all knew him to be an accomplished gentleman, who took a great interest in everything pertaining to the agriculture and commerce of the colony, and he did not think there was a better man for the office in the colony.

Mr. F. A. R. Winter seconded the motion and it was carried unanimously.

Dr. Carrington thanked the Society for the great honour they had done him. He considered the Presidency of the Royal Agricultural and Commercial Society a very important position, in fact, one of the most important in the colony. Having regard to the fact that a Chamber of Commerce was established, they might consider the functions of the Society in regard to that section as put somewhat in the background. But agriculture—the mainstay of the colony,—left plenty of scope for work, and although his connection with this great industry was limited, he would, as President of the Society, do his best to foster it. They might rely upon it that during his year of office he would not fail in his part whatever might be the result.

Mr. Thomas Daly proposed and Mr. Howell Jones seconded that the Hon. A. Weber be elected Vice-President, which was also carried unanimously.

Mr. Thomas Daly said that as Mr. Geo Garnett did not wish to continue in office as Honorary Secretary he would propose Mr. Luke M. Hill who had already served ably in the same position. This was seconded by the Hon. W. S. Turner and carried.

The Ordinary Directors were proposed by the President and seconded by Mr. Luke M. Hill; the Managing Directors by the President and Mr. Thomas Daly; and the Exchange Room Directors by the same, and all elected. The Committees, Local Secretaries and Resident Director in London, were also elected as per list attached.

On the motion of Mr. S. M. Bellairs a vote of thanks was accorded to Mr. Geo. Garnett, Honorary Secretary, for his services during the past year.

Mr. Watt moved and the President seconded that Mr. F. A. Conyers be retained as Honorary Treasurer, which was also carried.

A vote of thanks was accorded to the retiring President on the motion of Mr. Howell Jones seconded by the Hon. W. S. Turner.

The Assistant Secretary laid over three cigars made of tobacco grown in the colony; Mr. Howell Jones exhibited two very large yams; the Exposition Committee some extra fine cocoa-nuts; and the Agricultural Committee samples of rice grown from Indian seed.

The meeting then terminated.

REPORT OF AGRICULTURAL COMMITTEE.

Georgetown, Decr. 6th, 1892.

To the President and Members
of the R. A. & C. Society.

Gentlemen,—By direction of the Agricultural Committee, I have the honour to report on the several matters referred to them as follows:—

First, In regard to the copy of the "Kew Bulletin" containing a paper on "Sugar-cane borers in the West Indies," after consideration, it was taken for notification.

Second, Mr. Gaskin's letter, offering to recruit labourers in Barba-

dos was also taken for notification, on the ground that it was too late in the season to do anything this year.

Third, Mr. Hargreaves' motion that the Society consider the advisability of urging the Government to offer inducements for experiments in tobacco cultivation, was carefully considered. While deciding that they could make no recommendation in this matter, I was directed, in reporting, to give the following extract from the minutes of the Committee:—

"Professor Harrison was of opinion that some of the soils in the colony were well-fitted for tobacco, and that this if grown would be of good quality. The best Cuban Tobaccos were grown on a soil not particularly rich, and this accounted for their superior quality. The commoner kinds gave much heavier crops, and required a richer soil or manure, while the best quality gave a return of only about three hundred pounds per acre."

Fourth, In the matter of the samples of rice received from Mr. Mitchell in May last, they have to report that these, numbering twenty-one, were distributed in equal portions—seven kinds—to Messrs. Gillespie, Cochran, and Gilzean. As yet they have only the report of Mr. Gillespie which is here attached and the samples referred to laid upon the table, with a sample of creole rice for comparison. In general the yield was very good, the highest being that named "Guhota" which gave a return of 408 pounds, against 165 pounds of the creole variety. Two gave less than the standard, but as these were marked as less suitable for marshy land they did not get a fair trial. As may be seen from the report the varieties were grown in one place and under the same conditions, and the superiority of two varieties is most prominently shown, when it is understood that the samples only weighed one pound each. Mr. Gillespie was asked to continue the experiment and will be glad to supply samples to any one willing to help in introducing the best and most suitable variety.

The Committee have not been able to make any comparisons as to colour and flavour when cooked.

Having concluded as far as matters referred to them by the Society are concerned, the Committee direct me to call attention to the very useful work now being carried on by Professor Harrison, especially in connection with seedling canes. His duties are very onerous, what with those connected with the Custom House and Law Courts, not to mention the Botanic Gardens which may be considered as extra work.

The Committee desire to call attention to the fact that under the Adulteration Act an assistant is provided for, and they believe that help is urgently required. They therefore passed the following resolution at their meeting of the 5th instant and directed me to forward the same with my report:—

"This Committee advise the Society to urge on the Government to carry out the provisions of the Adulteration Act and provide assistance to Professor Harrison."

I have the honour to be,
Gentlemen,
Your obedient Servant,
JAS. GILLESPIE,
Secretary Agricultural Committee.

NOTE BY PROFESSOR HARRISON.

To produce the Havannah aroma in order to make cigars similar to those of Havannah, it is sufficient to *cultivate tobacco of the Havannah kind in a climate analogous to that of Cuba and upon a soil similar to that of the Vuelta Abajo of Cuba and to submit it to certain fermentations by the Cuban methods.*

Of these few conditions of success the choice of the soil is the most important. The soils which contain, like the best soils of Vuelta Abajo, ninety per cent of sand, six or seven per cent of clay, two or two and a half per cent of vegetable humus and a little potash, produce the fine and perfumed tobaccos. Upon soils where the proportion of clay is increased to ten per cent, or more, like in the Partides, tobacco is stronger, that is to say it contains more nicotine, but it has not the same quality.

Upon the soils which are clayey like those in the part of Cuba situated to the east of Havannah and known under the names of Vuelta Cariba, the tobacco is bad.

A soil sufficiently siliceous but poor in salts of potash produces a tobacco which is aromatic but which burns badly.

(Louis Lephene, Report to the French Minister in Mexico, Annales de la Science Agronomique, P. 387, Tome I, 1887.)

REPORTS ON RICE SAMPLES FROM R. S. MITCHELL, CALCUTTA.

Plantn. Houston, 16th Novr., 1892.

The only land available on this Estate is the bottoms of punt trenches, so the samples to grow on high land did not have suitable soil.

The samples were planted on 11th June and 5 weeks afterwards were transplanted; during the first two months after planting the weather was very heavy, total rainfall for June and July being 33 inches, as a consequence the rice-beds were often flooded for a length of time, said to be iujurious to the growth of the rice. The names of, and description of soil suitable for, the seven samples sent are mentioned and for the sake of comparison the returns from a sample of Colonial rice which was also planted, viz:—

NAME.	SOIL SUITABLE.	WHEN REAPED.	YIELD IN LBS.	LENGTH OF STRAW.
Ba-oor Jhar	High land	15th Sept.	340	4 ft 0 in.
Faparee	do. do.	do.	110	
Madhu Madhab	Slightly low land	26th Oct.	84	4 ft 10 in.
Lall Kalma	Low & marsh soil	22nd do.	180	5 ft 0 in.
Rajmohun	do. do.	24th do.	173	5 ft 0 in.
Kokella Voge	do. do.	1st Novr.	224	4 ft 9 in.
Gnhota	do. do.	4th do.	408	5 ft 0 in.
Colonial	do. do.	22nd Oct.	165	4 ft 6 in.

Plant. Versailles, 8th Dec. 1892.

The President, Royal Agricultural and Commercial Society, B. G.

Sir,—Having reaped the rice grown from the samples supplied me by Mr. Rodway, I have much pleasure in tendering the following report thereon, and only regret that the failure of those "*to be grown on high lands*" makes it less complete than I could have wished.

Of the four samples marked "*to be grown on low marshy lands*" the dark variety gave the heaviest return, although the straw was comparatively short, and none of the Indian varieties gave as much as a sample of same weight (1 lb.) of ordinary creole rice planted a week later under similar conditions.

The samples occupied four cross canals of 50 roods length and about a rood wide, but as no account was taken of the area on which each sample was grown, the weight per acre, can hardly be got at for each.

The plants were put in a little wider than usual and I have no doubt

in an ordinary season would have done much better, the rainfall being excessive. During the two first weeks of growth 12 inches of rain fell, and during the time the rice was growing, 1st of June to end of Octr., over 50 inches of rain fell here, completely covering the plants on several occasions.

I regret to say, the varieties to be planted on high land completely failed.

The following are the particulars of the different varieties:

Name.	Dscptn.	Sown.	Cut.	Length of Straw.	lb Unhusked Rice.	Remarks.
Kalandi	Dk. C'lrd.	30th May	5 Nov.	3 ft.	155	With one or
Creole Rice	Ordinary	13th June	„	3 ft 3 in.	162	two excep.
Chotay Dholay.	Small	30th May	„	2 ft 9 in.	103	tions the lots
Charuarmoni	„	„	12 Nov.	4 ft.	54	have ratooned.
Nackra Sal	„	„		3 ft.	143	

The 3 samples which did not grow were "Chackra Sal" "Belder" and "Cupra Sal"

I am, Sir,
Yours truly,
S. R. COCHRAN.

REPORT ON SAMPLES OF INDIAN RICE GROWN ON PLANTATION ANNA REGINA, FROM SEED SUPPLIED BY THE ROYAL AGRICULTURAL AND COMMERCIAL SOCIETY OF BRITISH GUIANA.

Seven different kinds of rice seed were supplied to me, and, handed to Mr. McPhail, who writes me, as follows:—

The 7 samples of Indian Rice were placed in water on June 11th, soaked for 24 hours and planted out on the 12th, in nursery beds well prepared with pen manure, the paddy being thickly sown on the surface and then covered over with rice straw. On lifting portions of the straw on the afternoon of the 13th it was observed that the seeds were beginning to burst—24 hours after sowing. On the morning of the 16th little shoots about an inch long could be seen on all the nursery beds, and on the morning of the 18th they had burst through the straw. On the the morning of the 19th the straw was taken off, and the beds

shewed a beautiful green carpet of rice averaging four inches in thickness. Half an acre of land was prepared in the usual way, and divided into plots for the reception of the plants.

The young rice from the nursery was transplanted into this on the 11th July, when the plants averaged about sixteen inches in height. About four inches were trimmed off the top of the plants before planting. About four shoots were planted in each hole and the holes were about a foot apart. The plots were weeded on the 9th of August, and on the 20th about 4 inches were trimmed off the tops of all the plants except the creole. The creole rice began to show a few ears on the 3rd September, then the Sonadhobay nearly a month after, the others following in the order on which they were subsequently cut. The Musloti and Orah Mettah had a curious black appearance until they were nearly ripe when tbe Musloti lost it to some extent."

Name of Samples.	Return per Acre in One Crop.		No. of Days' Growth from Transplanting to Reaping.	Lbs. Paddy Grown from 1 lb. Seed.
	Lbs. Straw.	Lbs. Clean Rice.		
Ramsah	13,200	2,772	125	264
Musloti	8,005	2,747	114	225
Orah Mettah	12,269	3,777	136	317
Bhojora	8,996	1,916	115	169
Sonadhobay	5,726	2,221	112	272
Bowdhobay	12,097	2,229	113	256
Connickchoor	9,261	1,415	136	170
Creole	8,197	1,652	97	98

As some of the Connickchoor was stolen it should be left out altogether, if it were not desired to shew that it can be grown here to advantage. The number of pounds of paddy from a pound of seed in the case of the creole sample is not reliable for several reasons, but with these exceptions I think the figures in the table are to be depended upon. The extraordinarily good results caused me to verify them by every means in my power. The conditions under which the trials were made were exceptionally favourable for good results. The supply of water

could be regulated at will and there was plenty of sunshine. Although the samples were described as suiting soil more or less wet, we have grown them all under the same conditions viz., with a constant supply of abont 4 inches of water over the surface of the ground during the whole period of growth.

The weight of straw, as given in the table, was taken after threshing, and when it was comparatively dry. I may mention here, that every pound of rice-straw grown here is used for feeding horses and cattle, for which use it is greatly appreciated. The weight of clean rice was obtained by weighing all the paddy from the trial plots, and cleaning two gallons of each kind in a mortar, on the results of which the totals were worked out. The weight of the rice broken in cleaning is included with the whole rice. Of course the samples were only roughly cleaned, and a further small percentage would be lost, if they were cleaned and polished in a mill.

As the rent of rice-growing land is high here, I have entered in the table only the days of growth after transplanting. The nursery beds are so small as not to be worth taking into account in drawing any conclusions from the relative value of the different kinds of rice as regards the length of time they take to grow.

With regard to the quality of the different samples it will be interesting to have the opinion of experts. To me it seems that they are all of fair quality, although the grain of all is rather small except the Connickchoor, which is of a variety very distinct from the others in every way. It has a round chalky grain, while all the others have longish and more or less translucent grains. The Orah Mettah has got a reddish-brown skin, which cannot be entirely removed in a mortar and which, added to its smallness and stoutness of grain, gives it a very mean appearance in the state in which it can be brought by the means at our disposal. None of the Indian samples can approach the creole samples in appearance. It maintains its high character for excellence of quality, the grains being of a large size, good shape and beautiful colour.

The Indian samples have shewn wonderful results in weight of crops. If further trials shew equally good results some of the varieties will be largely adopted by the rice farmers here, although the grand quality of the creole rice and the comparatively short time which it takes to come to maturity, will always make it a dangerous rival. The Orah Mettah shows a return of over 20 bags of rice to the acre in one crop and there

would be no difficulty in raising two crops in a year. Forty bags of rice, however poor in quality, would fetch at least a hundred and forty dollars. From my experience of rice growing, I think I am safe in estimating that the cost of seed, preparation of land, already used for rice growing, transplanting, weeding, topping, reaping of two crops, and threshing by hand and cleaning in a stamper pot, 40 bags of rice would not exceed sixty-five dollars. If twenty-four dollars is added for rent of land and water supply, the cost of production comes to eighty-nine dollars. This shews an apparent profit of fifty-one dollars per acre per annum, which seems almost too good to be true.

The result of the experiments point to the probability of such enormous profits accruing from the growing of some of the varieties of Indian rice under the very favourable circumstances which are at our disposal here, as to call for immediate trials on a larger scale. Arrangements are being made to have these carried out.

A. R. GILZEAN.

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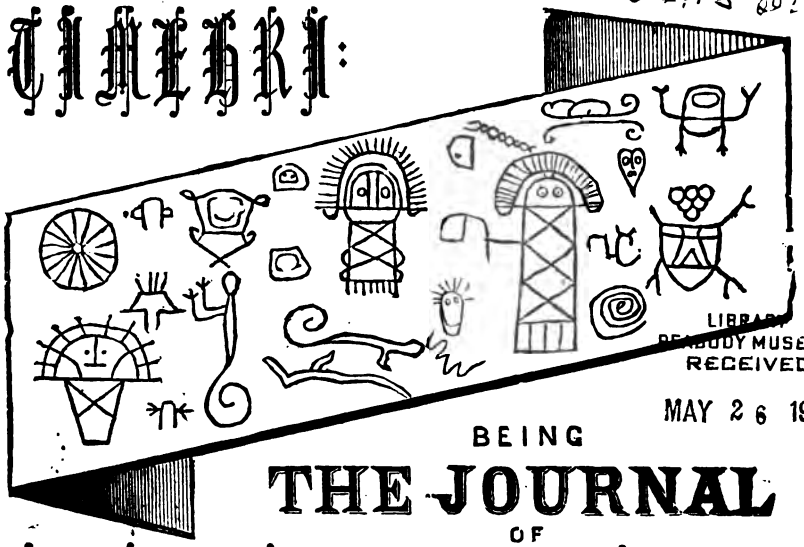

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